THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW.

A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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THE CONDUCTIVITY OF COPPER.

A great deal of work in the line of producing copper castings has been done in the last few years, intended for electrical purposes, and one of the requirements for that particular case is that the electrical conductivity should be as high as possible. Little was, however, known with regard as to how small amounts of various other metals present in the copper would affect its electrical conductivity of the latter, as the investigations carried on in that line had been mostly confined to the study of the variations brought about by the presence of larger amounts of other metals. Recently, however, Mr. L. Addicks has been conducting experiments in that line, and his results are of much interest. Among the metals which he tried were aluminum, phosphorus and silver, and the results are very interesting when considered in their bearing upon the question of the various deoxidizers, which are currently used in order to obtain homogeneous copper castings. He finds, for instance, that an addition of 0.006 per cent. of aluminum brings the conductivity down to 98.6 per cent., while 0.109 per cent lower it to 66.8 per cent and 0.739 per cent. of aluminum lowers it as far as 43.5 per cent. Phosphorus has a still more deleterious action on the conductivity of copper, inasmuch as the addition of 0.080 per cent. was sufficient to lower the conductivity of the copper to 52.3 per cent., showing conclusively that when phosphorus is made use of as a deoxidizer in copper castings, the conductivity is bound to suffer considerably. Silicon, on the other hand, showed an entirely different behavior. When added in amounts of 0.007 per cent., in one case it lowered the conductivity to 99.4 per cent. and in another case to 99.1 per cent, while an addition of 0.042 per cent. failed yet to bring the conductivity down to lower than 99.0 per cent. The factors which express the ratio of the lowering of the conductivity to the amount of impurity present vary therefore very widely, it being 3,000 for phosphorus and only 70 for silicon, while the factor for aluminum is 500, showing that the latter is also considerably more hurtful in its influence on the electrical conductivity than silicon. The results thus obtained are of considerable interest, inasmuch as they show definite numerical values of the influence of the three substances on the conductivity of copper, and thus substantiate the claims made for silicon in this connection, which had been found to be the case in practical working.

AMERICAN TIN.

THE METAL INDUSTRY received recently a communication on the subject of pig tin in which the writer stated that tin was about the only commercial metal that is not produced in paying quantities in the United States, and while we consume at least 50 per cent. of the world's production, we seem content to pay the English and Dutch dealer a premium of 50 per cent. for our supplies without our making a strenuous effort to extract the metal from known deposits in our own domain. The writer then went on to say that in a trip through the Black Hills of South Dakota he believes he saw tin ground, which if worked systematically and economically would profitably yield enough pig tin to bring the market price down to a reasonable basis, and at the same time make the United States independent of foreign manipulation. He believed that the Black Hills tin deposits were not well known excepting to prospectors who lacked funds and to promotors, who were more interested in selling stock than in procuring the metal, but if the deposits were more widely known that they might result in the production of American tin. Our correspondent stated that one of the largest gold mining industries in the world is within a few miles of the tin ground, and it is claimed that the tin lodes carry enough gold to cut quite a figure in the cost of mining and milling for tin.

It is true, as our correspondent states, that pig tin is about the only commercial metal with the exception of nickel that is not produced in paying quantities in this country, and it is also true that tin is found in the Black Hills region and in other parts of the United States. The production of tin ore in the United States for 1904 amounted to 159 short tons, which contained from 40 to 70 per cent. of metallic tin, and this was obtained from deposits in South Carolina, South Dakota and Alaska. It is also true that the consumption of tin in 1904 was greater than the world's supply. The estimated consumption by the United States Survey being 94,755 tons, which was 2,512 tons more than the world's supply. The amount imported into the United States for the fiscal year ending June 30, 1904, amounted to 40,832 short tons, valued at $21,486,311, the greater part of which imports was produced in the Malay peninsula.

The difficulty for the production of American tin has not been so much due to the lack of ore, for as cited, there is a visible supply in a number of localities, but in the difficulty of obtaining pure tin free from iron and other impurities. The writer has had considerable experience in examining American tin mines and tin ores and the possibilities of the producing of American tin, and the result of his experience has been that American tin with the present processes of reduction cannot be manufactured profitably. The tin stone (cassiterite) found in the Black Hills is not associated with gold. The presence of tin deposits in North Carolina has been known for nearly 20 years, and a prominent New York metal firm spent thousands of dollars developing a tract of ground near King's Mountain. The stream tin was unworkable at that time, being mixed with much refractory iron bearing matter, and the lode or vein deposits were found to carry a tin content too low to make working profitable. The Dakota deposits have had a great amount of money expended upon their exploration but without success. There is a hope, however, that new processes, notably the *magnetic separation,* will make the production of pure tin much easier than in the past, but no known tin deposit has yet been opened in the United States which can produce commercial tin at the present price. It is to be regretted that these are the facts, but the only promise of success as we understand it is in new processes of separating tin from its ores or in the discovery of new mines which are workable with the present methods of reduction.

CAST VERSUS ROLLED NICKEL ANODES.

The difference in behavior between cast and rolled nickel anodes is easily appreciated when it is borne in mind that cast nickel has a specific gravity of 8.3, while the specific gravity of rolled nickel is 9.3. The latter therefore is much denser and not easily attacked when put into the plating bath, while the former is of a softer porous nature and when cast in sandd usually dissolves with ease. When cast in chilled molds it i,, however, like the metals, chilled and hardened at its surface and dissolves with greater difficulty. It is therefore possible, by the use of both kinds of modes in the plating bath, thus to regulate the solution of anodes that the great object is obtained, which is a desideratum and an unavoidable condition in a nickel bath; namely, to keep the original reaction of the bath as constant as possible. There are no hard and fast rules to be laid down in regard to the proportion of the cast anodes versus the rolled anodes which is to be used in the nickel baths, as there are so many different nickel baths in use, but if the above condition is kept in mind and the bath is tested in order to ascertain whether it remains in approximately its original condition, troubles with the nickel bath will be largely reduced. As a rule, it will be found that the greater the resistance of the bath, the more rolled anodes will be required, while if the bath is a good conducting one, the proportion of rolled anodes will have to be increased. When on testing the bath it is found to have become alkaline, this would indicate to the plater that the number of rolled anodes should be increased, in order to increase the formation of acid and thus to neutralize the alkali, while when the bath becomes too acid, it calls for the introduction of more cast anodes. Attention should also be paid to the correct placing of the two kinds of anodes in the bath, inasmuch as when the cast anodes are hung on the ends of the conducting rods they are attacked quite strongly. It is therefore better to place them more towards the center of the rods, and to place the rolled anodes on the ends. A judicious use of both kinds of anodes therefore will enable the intelligent plater to keep his nickel bath constantly in the proper working condition.

CASTING GERMAN SILVER FOR ROLLING.

By Thomas Clare.

In order to melt the German silver it is necessary to build a furnace which will accommodate a No. 60, or better still, a No. 70, crucible. To accommodate the latter it is necessary to have a furnace 14 inch square and 9 or 10 courses of brick deep. It is best arranged with fire bars which can be drawn. When the bars are put in place, a space of about an inch between the bottom of the furnace and the top of the fire bars should be left. A procedure like this makes it possible to rake out the dust and dirt which accumulates during the day, and by doing this it will be found that there is always a good clear draft through the furnace. The flue for a furnace of this size should measure 6x9 inches, and nothing less is suitable. The ash pit should be 18 to 20 inches below the fire bar. It should be cleaned out every morning and every time the fire is drawn.

The melting crucible is placed in the center of the furnace and the fuel is put in equal parts around it. The nickel and copper, together with the flux (borax), is put into the crucible and the cover is then put on the latter. A good fire is then made up until the charge is melted. When the melt is complete it should be well stirred with a black lead stirrer. After this the scrap is added, if any is to be used. When this is all melted, the zinc should be added, but before doing this, the operator should be quite sure that his metal is ready to receive it. If the metal is not hot enough, a pasty substance will be found on top of it, and when this is skimmed off it will come off in lumps. If this is the case it is best to heat the crucible with the metal in it and then get it good and hot and flux it well. The skimmings should then be put back into the crucible and the mixture stirred well, after which it is poured. Then, again, if the metal is too hot, a large portion of the zinc which is put in will volatilize. The metal will also boil over into the fire and thus cause a great loss. In addition to this the proportions which were intended to be in this resulting alloy are changed and the composition of the metal is thus spoiled. If the metal is too hot, the best method of procedure consists in cooling it down with scraps of the same metal as that being made. The zinc is then put in and the metal is well stirred. After that it is poured, but it is of a great importance to have it hot enough before pouring.

When the metal is poured, the operator should be careful that no dirt gets into the mold. The skimmer should be held in front of the stream just on top of it, but not in it, for the reason that, if the skimmer is held so that the molten metal touches it, the latter will melt it. The operation of pouring should be conducted in such a way that the metal is poured in a good steady stream. The stream should, however, not be too strong, as in that case the metal will boil over the mouth of the mold. On the other hand, if the stream is not strong enough, the edges of the strip will become smutty and dirty and are also likely to crack in the rolling. The size and strength of the stream should be governed by the size of the mold that is being used.

I will add just a word in regard to the molds. My experience has taught me that it is not possible to get good results by casting wide metal. I think about five inches wide is the best for sheets. The metal can then be spread in rolling to any width the operator may desire. The molds for German silver should be a little full in the centre, that is to say, they should be 1-32 inch thicker in the center than they are at the edges. The reason for this is that it gives the metal a much better chance for shrinkage, when in the course of casting, than it would if the molds were the same thickness right through. Quite often it is found that the molds are bent and do not fit well when they come from the molder. This, I suppose, happens on account of the patterns being taken from the sand improperly. The molds in that case have to be straightened and the best way to accomplish this operation consists in getting them red hot and placing them on a perfectly level surface. They are then weighted down and allowed to cool off, with the weight remaining on them. When they are cooled off, they will be found to be right. The best and proper way is to send them to a machinist, who will hammer them straight without heating them and will fit them together, so that when the metal is poured off, it leaves no feathered edge which has to be subsequently filed off.

A melter should be able to wash and use his shoe sweeps, that is to say, the black dirt which accumulates just where he stands at his furnace and around his molds, where he pours off his metals. He should also be able to utilize his skimmings. The ashes should be sold, unless the melter has proper facilities to grind and wash them, etc. If this was done there would be a large saving effected in the casting. While in England I used to cast by contract, at so much per ton, and I was allowed less than 2 per cent. loss on the whole. All grades of German silver, brass, bronze, gilding metal and copper were produced, and it was frequently quite a task to make both ends meet. There was nothing sold, neither skimmings, shop sweepings nor ashes, and the manufacturers could tell exactly what the loss was, as the metal was weighed out to me and credited to me when cast in strips. I think that this is the right way in which to proceed, for then there is no fear of unnecessary waste.

In order to prepare the molds lard oil or some other strong oil should be used. After they are oiled, they should be closed and clamped together with iron clamps, which latter are made to fit the molds. They are then fastened together with iron wedges, which will keep them quite tight, while the metal is being poured. The above remarks concerning molds will apply in every particular to gilding metal and copper, in fact, to any metal rich in copper, but these metals can be poured in wide molds.

In making German silver the very best brand of metals is an absolute necessity. The best Lake copper, the purest nickel and pure Bertha zinc should be used. In my opinion a natural draft furnace is the best furnace for making German silver. After the first melt in the morning it will cost no more for fuel than an oil furnace, that is, when using coke. I have melted 100 pounds of 18% German silver with one bushel of coke, which as we bought it only cost 67 cents per bushel. I think the natural draft furnace gives the best economy, inasmuch as the life of the crucible is twice as long with natural draft as with the oil. Moreover, when using oil, the furnace will need re-lining every few days, while the natural draft furnace will last four or five weeks.

When breaking down German silver, good strong rolls should be provided, inasmuch as there is considerable strain on the rolls. Attention should be paid to rolling the strips sufficiently, so that they will stand the fire without cracking. They are then taken to the muffle and annealed. In order to do this the metal should be gotten

up to a cherry red temperature and should then be taken out and carefully laid aside, until it has cooled off. It should be carefully avoided to handle the metal roughly while it is hot, as such a procedure will crack it. It should also be avoided to throw water on the metal, inasmuch as this will also crack it. The metal is very sensitive when it is hot and great care should be exercised when handling it, until it has cooled off. When the metal is rolled down the second time, it should be scraped in a scraping machine before it is annealed, in order to take off the outside skin, which is liable to be spilly. It is then annealed and rolled and the operation repeated, until it is gotten down to the required gauge. German silver can be cross-rolled into sheets of any width. When annealing German silver at any stage of the rolling process, careful attention should be paid, so as not to leave it in the fire after it is hot enough, and it should just be gotten up to a cherry red temperature.

BLISTERS ON RIBBON SOLDER.

By Jesse Jones.

Users of ribbon and wire solder are more or less familiar with the fact that blisters are sometimes found on the surface of these forms of solder. Frequently these blisters are very minute and at other times quite large. In some 1/16 x ⅜ ribbon solder recently examined the blisters were strung out along the central line of the ribbon in a long series, reminding one of a string of sausages.

BLISTERED AND UNBLISTERED SOLDER.

On using the solder minute explosions occurred now and then, sometimes causing globules of the molten solder to fly into the faces of the workmen. Only a few of the blisters acted in this way and many of them caused no trouble whatever, as they seemed empty, the outer wall of the blister being split longitudinally as if a gas of some kind had been originally enclosed therein but had burst through and escaped.

While the element of personal danger to the workmen using the solder was not great the cause of the trouble seemed worthy of investigation. It was found that the solder was free from antimony, copper, etc., and that it did not cut the soldering iron. The proportions of lead and tin present were strictly in accordance with the specification on which it was bought, so that the only objection to the solder was the blisters.

It was not found possible to collect any of the gas that seemed present in many of the blisters, but from the way it acted it was thought to be hydrogen. The manufacturer of the solder inclined to the opinion that the trouble was possibly due to the temperature of the metal as it passed through the die through which the material is drawn, but stated that repeated investigations and experiments had failed to give any satisfactory or uniform results.

It is the opinion of the writer that the quality of the tin was the primary cause of the blisters. In buying Straits tin the warehouse receipt for an approved or registered brand is considered equivalent to delivery, and while most of the brands are of excellent quality, some of them are often contaminated with more or less oxide and dross. It is at times necessary to take whatever brand is on the market at the time of purchase and if found dirty it has to be fluxed with sal ammoniac or rosin. These fluxes by their action on tin or lead oxides generate gases that could be included in the solder as it passed through the dies and thus cause the blisters.

In galvanizing pots, on which sal ammoniac is used as a flux, it is no uncommon thing when the metal is being run hot to hear frequent small explosions due to the gases that are being disengaged by the reaction of the sal ammoniac on the zinc oxide, and some times one might think that a miniature Fourth of July celebration was in progress. The reaction in the case of the galvanizing pot is probably the following: $Zn O + 2 NH_4Cl = Zn Cl_2 + 2 N + H_2O + 6 H$. The explosions in this case were undoubtedly due to hydrogen, the heat of the metal being sufficient to ignite the gas.

The explosions in the case of the ribbon solder did not seem to be due to ignition of the gas or gases present, but rather to their expansion from the heat of the soldering iron, thus causing the blister to burst. While the heat used in making solder is not nearly as high as that used on a galvanizing pot, it is probably high enough to cause a reaction between the flux used and the oxides of tin and lead present, thus disengaging the gases that form the blisters.

GERMAN ROLLING MILL.

The works of Julius und August Erbsloh, Bremen, Germany, produce polished silver and gilded copper sheets, rods and sheets of aluminum as well as brass and German silver sheets and brass wire. The power is furnished by a steam engine of 180 horse-power. The factory has a large number of small rolling trains with two rolls each. The copper sheets are manufactured from American rolled bars of about 220 pounds weight. The latter are first rolled warm, then cold. The copper sheets are silvered on one side and then rolled till they are finished. The finishing rolling is carried out with a great deal of care by means of polished rolls.

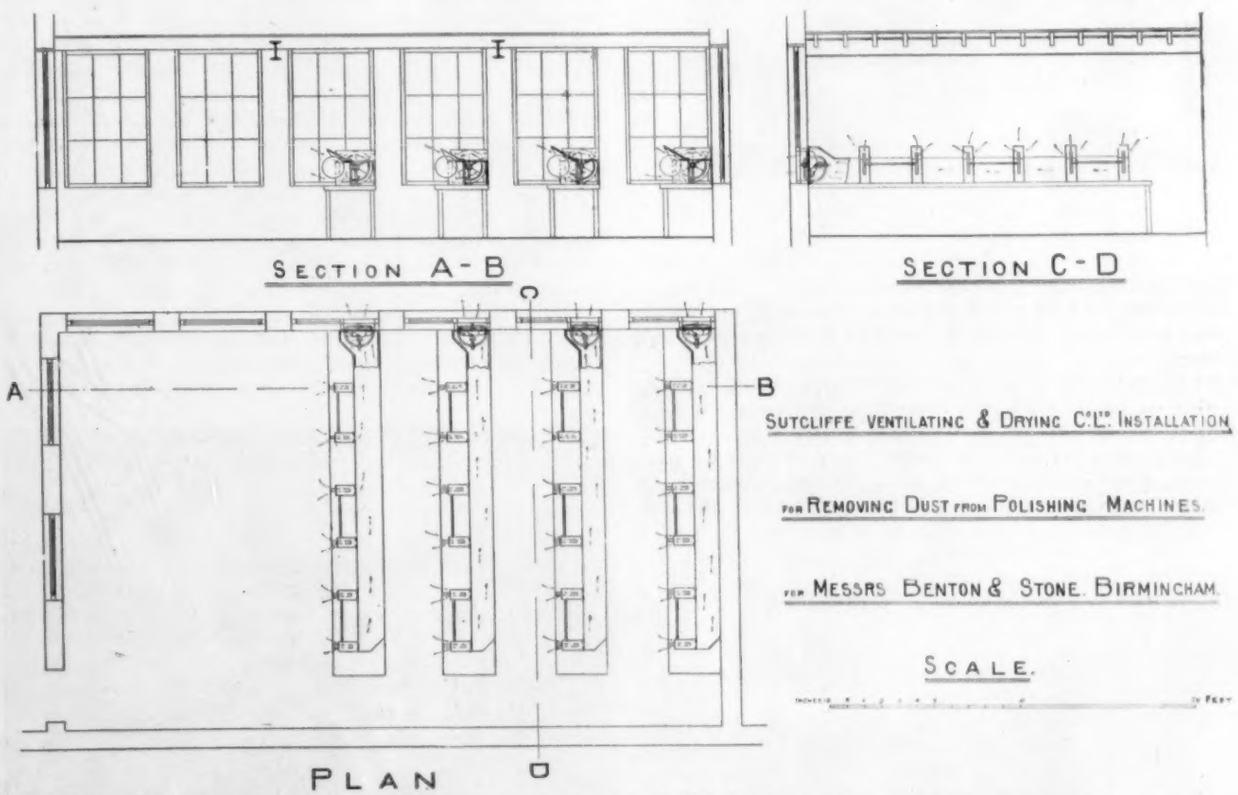
Brass ingots of rectangular or oval form, about 110 pounds weight, are cast in dry sand. The rectangular ingots are used for the manufacture of sheet and the oval ones for the manufacture of wire. In the latter case the plates are rolled down to six millimeters thickness and then are cut in spiral shape with scissors. In the manufacture of wire according to this method there are obtained 88 kilograms of wire and 11 to 11½ kilograms of waste from a plate weighing 100 kilograms. The loss is about ¾ to 1 kilogram. The aluminum ingots are imported from Switzerland or America and consist of cakes 75 to 100 millimeters thick; they are rolled cold. After they have been annealed and have been dipped in caustic soda they are scraped by hand with scrapers in order to remove any slag or dirt, etc. The rolling is then continued cold and the sheets are finished after annealing and dipping. The annealing furnaces are muffle furnaces with cast iron muffles.—*Metallurgic.*

VENTILATION OF METAL-WORKING ESTABLISHMENTS.

By Our British Correspondent.

Some particulars have been given in a previous article of a Birmingham apparatus for extracting the noxious fumes given off during the operation of brass casting. This, however, is only one branch of the question of ventilation, which of late years has received a great amount of attention throughout the Birmingham brass trade, and in Midland metal shops generally, with the result that improvements are very rapidly being effected. It is startling to learn from Mr. S. H. Knyvett, the Midland factory inspector, that during the past two or three years, he has sent requests to nearly six hundred firms in his district to introduce ventilating apparatus. That number, of course, includes many metal establishments, in addition to brass factories, but, roughly speaking, it represents quite 10 per cent. of the factories in which the various processes have a tendency to pollute the atmosphere. In the course of an informal chat with the Birmingham representative of The Metal Industry, Mr. Knyvett gave a number of interesting particulars, showing the progress made on the subject, remarking that in no single instance had he met with a blank refusal to carry out his wishes, while not only had he noticed a marked improvement in the general health of the workers, but it was quite evident that the purer air contributed to a much more energetic discharge of their duties. The inspector points out, however, that the effect of bad ventilation is not usually seen in actual breakdown culminating in mortality, so much as in a low tone of health and general ailing condition. He says: "I am persuaded there is a large amount of illness among brass casters and brass mixers, which is due to the inhalation of noxious fumes. Brass casters undoubtedly have a worse time than polishers, but there is also a greatly increased stringency being shown with regard to the ventilation of polishing shops in the brass trades, particularly where emery is used. Polishing is injurious, not only on account of the dust given off, but on account of the textile particles of fluff which comes away from the colored mops." Mr. Knyvett, summarizing the history of ventilating improvements in the district, said that ten years ago there was an inquiry by a government commission which resulted in some improvement being made, restricted, however, to non-mechanical arrangements, but the local workmen's association pressed the government for something further, and as they were able to point to a couple of deaths which were clearly attributable to lack of ventilation, the government lent an attentive ear. The matter having been referred to in Parliament, further reports were demanded from all the local inspectors, which were sent in three years ago. These were handed back to Mr. Knyvett for the purpose of a summary and a special report by himself on brass trade ventilation for the whole kingdom. He visited—in addition to Birmingham—Sheffield, Bristol, Manchester, Liverpool, London and Exeter, and sent in his report in June last, and this is still under consideration. It is expected that some practical directions resulting therefrom will be issued not later than June next.

In the meantime the local inspectors who are fully alive to the importance of the matter, are missing no



This plan, which was drawn specially for The Metal Industry, shows the Sutcliffe installation. There are four benches, each bench fitted with six bobs and an 18" Sutcliffe fan is fixed at the end of each bench and draws the dust away. A large number of Midland shops have been fitted up with similar installation.

opportunity to effect improvements, and Mr. Knyvett has very decided views on the general principles which should govern ventilating operations. He says: "The old-fashioned idea was to put in a fan somewhere, probably at the top corner of the room, but the manufacturer did not care where. But what you want to do is to draw the dust away at the point of creation. Ventilation is now carried on on scientific principles, but the science is still in its infancy, and our ventilating engineers have certainly not got as far as they will get by and by, though

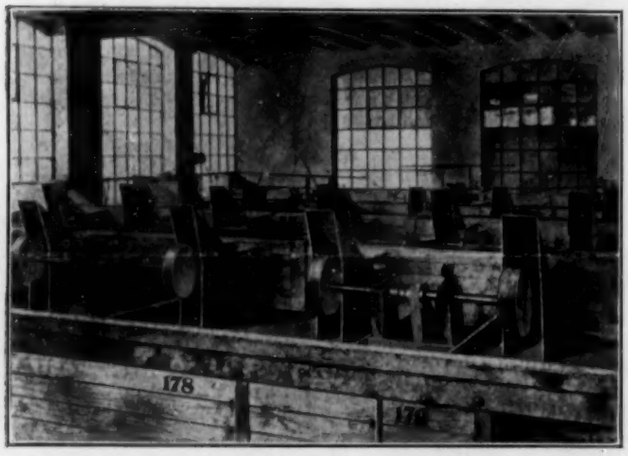


FIG. 1. THE SUTCLIFFE INSTALLATION.

they do grasp the one fact, that the essential thing is to draw the dust away from the worker."

The first firm to adopt modern ventilating arrangements was that of Benton & Stone of Bracebridge street, Birmingham, whose apparatus has been inspected by some fifty representative deputations, including a party of visitors representing the Norwegian government. This system, which was put in by the Sutcliffe Ventilating & Drying Company, Ltd., of Manchester, consists of four 18-inch Sutcliffe fans fitted with an arrangement of hoods or cowls and ducts for the collection and carrying away of the dust. Fig. 1 shows the polishing shop with four benches and 24 polishing bobs. The cowl at the back of each bob has a draught of air sufficiently strong to attract every particle of dust. At the back of the cowl is the duct, or tunnel, extending the whole length of the shop, and serving for a machine. At the end of each is an 18-inch fan, which draws out all the dust, discharging it into the yard outside the premises.

The Sutcliffe fan has had the honor of favorable mention by the chief factory inspector in his annual report for 1903. After visiting Messrs. Benton & Stone's establishment, the official wrote: "It is a much more efficient manner of removing dust than by fixing a fan high up in the wall of a polishing room, as the action of such a fan must draw the dust upwards and across the face of the workers, while in this case the dust from each mop is separately drawn away, and it is not scattered through the room at all." The inspector accompanied this compliment with a photograph of the Benton & Stone installation, strongly recommending it for general imitation. The firm themselves assured the makers of these fans that they were doing their work splendidly and that the polishing shop was now the cleanest and healthiest department in their works. Mr. Herbert Stone, in a chat with the writer, pointed out that years ago the common remark with regard to polishing was that no polisher lived beyond the age of 40, but that the firm have changed all that. The perfect ventilation has made the atmosphere perfectly pure and wholesome. He understood that the Home Office were making the introduction of this or some similar apparatus compulsory. Examinations have been made not only of the air of the room, but of the physique of the workers before and after the introduction of the apparatus, and the improvement was very marked. Ordinarily polishing shops are injurious because of the use of quicklime, or what is called triple compo, the dust of which is very likely to inflame the lungs. These compositions are popular in the trade on account of the gloss they give to the metal. The ventilation is so complete that the air of the shop is changed entirely every two minutes, yet the movement is so distributed that in no part of the room is there any impression of draught. Formerly the accumulation of dust was so great that the beams and the walls had to be swept every month, but in that period now there is practically no accumulation. Upon the health of the workers the effect has been wonderful, and the result is shown in an increased output by fully 10 per cent. The firm have always been among the very first to adopt improvements likely to add to the comfort of the work people, and, in fact, they are always on the lookout for these. From the point of view of efficiency and output, Mr. Stone considers that the apparatus has paid for itself several times over, while from the humane point of view the firm point out that an end has been put to cases of health breakdown, a matter to which they attach the greatest importance. In the past it has been their painful experience to see men break down in the prime of life and die prematurely from dust inhalation. As may be expected the work people themselves thoroughly appreciate a change of such vast moment to themselves as increasing their own health, earning power and longevity.

The system has been adopted by a great variety of trades, including the makers of cycle components, lamps, jewelry and cutlery in various forms. In the jewelry trade the system has a great value from the economical

FIG. 2. THE BLACKMAN INSTALLATION.

point of view, but in such cases the conduits, or ducts, have to be of a closer fibre, and more completely airtight, and the dust collected from the precious metals is moistened and discharged into a special receptacle attached to the end so as to facilitate the analysis of the deposit and the extraction of the pure metal.

Fig. 2 shows a slightly different application of the principle in the Blackman fans, the manufacture of a well-known London firm, James Keith & Blackman Co., Ltd. This firm have installed nearly 500 dust removing systems into works in Birmingham and district. An interesting

feature of this arrangement is that the bench underneath the bobs—marked 1—is utilized for the duct. Fig. 3 is interesting chiefly on account of the upright main duct

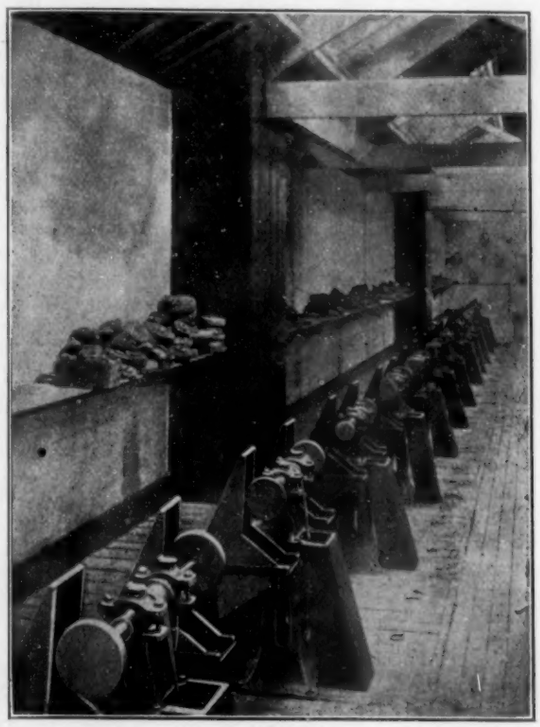


FIG. 3. THE UPRIGHT MAIN DUCT.

marked (2), which receives the deposit from the horizontal tunnel underneath the machine. One of the shops fitted by this firm has in it forty spindles, and the system is so efficient that the owner describes it as "delightfully clean, cool and healthy," every particle of dust being dealt with. The firm have executed contracts in this line at figures from £2 10s. up to £200. Many of the largest firms in the district, some employing thousands of hands, have the Blackman installation.

CARE AND STORAGE OF PATTERNS.

In a paper before the recent convention of the American Foundrymens' Association, held in New York City, the author deals at some length with the storage of patterns and with the methods adopted for guiding against fire. He summarizes the following points in connection with the subject of pattern storage: First, no matter how many men are allowed to take patterns from the storage, only one man should be allowed to return them, and he should be held responsible for every pattern; second, where only a limited number of small or medium sized patterns have to be cared for, it is foolish to install any hoist or elevator system for handling the patterns, as in most cases the attendant has ample leisure to put them away, and in many cases he can carry them upstairs cheaper than they could be taken up on an elevator, which would ordinarily stand idle 99 per cent. of the time; third, whatever system is in vogue, some provision must be made for taking care of the dead patterns; fourth, wooden patterns must never be stored where they are subject to rain or snow, or even where they are subject to freezing temperatures, for the reason that moisture in the surface of the pattern will be frozen and injure the surface or finish. The freezing will also often open the joints.

PRACTICAL POINTS ON COLD GALVANIZING.

By Louis Schulte.

The process of cold galvanizing which to-day has reached a considerable state of development in Europe, and especially in Germany, seems to be yet in its infancy in the United States, whereas in Europe large plants may be found which for years back have produced galvanized angle iron, T iron, tubes, sheets, wires and hoop iron, besides a number of smaller and larger machine parts and hardware at a good profit and to the satisfaction of the customers. In the United States the production is limited in the main to galvanizing smaller articles like hooks and screws, etc. Sometimes one sees a few iron rods which have been galvanized electrolytically, but such articles as angle iron, tubes, wires, hoop iron and sheets, galvanized in the electrolytic solution, are not to be found here. Now and again in electro-plating establishments it is possible to find samples of articles of the above description galvanized electrolytically, but the American manufacturer, as well as the consumer, do not seem to have much confidence in the matter.

There is a certain prejudice existing on account of the belief that the deposit obtained by cold galvanizing would not be so much proof against rust than that obtained by dipping into molten zinc. This prejudice was still further augmented by the fact that many electro-platers and even people without any knowledge of the electrolytic process took iron articles for the purpose of cold galvanizing them which they returned to the customer partly with a bad zinc deposit, partly with a thin deposit or with both, for which job they asked a high price. In consequence the people had their articles treated in that manner only once, or they tried another electro-plater, who stated that he had a much better solution, but in most cases his success was also negative.

There are existing, however, within the last years, few firms which furnish really good zinc baths, with the proper treatment of which a rust proof zinc deposit can be always guaranteed. I will not, however, deal in this article with any ready made-up bath, in using which the electro-plater never knows what he has. The purpose of this article is to give the electro-platers some practical points along the line of cold galvanizing, it being immaterial with what bath the work is carried on.

It would be quite wrong to assert or to believe that only a certain solution with certain chemicals would give good results. Practical experiments have shown that. Some quite different bath with quite different salts gave equally good results if the bath were treated differently according to their composition. The main point in cold galvanizing is that, when using acid, neutral or alkaline bath, there are also used the conductive salts and chemicals which belong to each respective kind and which are different for each. For instance, an acid bath is not good which contains salts which would be better suitable for neutral or alkaline bath. Furthermore such salts should be avoided which, when decomposed by the current, generate many bubbles of hydrogen, inasmuch as thereby the deposit looses in cohesive strength and blisters and warts are easily formed. When too much of the conductive salt is used the metal is apt to deposit too rapidly, especially at the corners and edges of the goods, and in that case also the deposit is apt to be somewhat soft and rough.

In too acid baths the deposits do not adhere well, especially on smooth articles, and the deposit from an acid bath easily cracks off, especially when the articles are bent or hammered. On the other hand very alkaline baths have the disadvantage that at the anodes there is formed

constantly a basic zinc salt (zinc hydroxide). This is a spongy, blackish gray mass, which not only interferes with the conduction of the current, but which also forms a slime which in time detaches itself from the anodes and swims around in the bath or deposits upon the goods being plated. Furthermore, it is impossible to obtain a heavy rust proof deposit in a short time in a dilute solution which contains little metal. Attention has also to be paid that the zinc deposit takes place in the deeper places of the individual articles just as well as at the high places It is furthermore necessary to have the current regulated in an exact manner. If these points are followed exactly, it will be only a question of time until the deposition of zinc by the galvanic process will be preferred.

A bath which has been corrrectly made up should give an absolutely rust proof deposit within 20 to 30 minutes. A movement of the cathodes is of great advantage for electrolytic galvanizing, and it should never be dispensed with if it is at all possible to carry it out. By the motion of the cathodes, any bubbles of hydrogen which form on them are continually gotten rid of. It is therefore possible to work with a stronger current, and the deposit is more even than that obtained in a quiet bath. The anodes should consist of rolled sheets of zinc of different thickness. The latter do not occasion such a large formation of slime as the cast zinc anodes.

The best results, however, can be obtained with electrolytic anodes, which can be produced by the plater himself

STEEL AND MALLEABLE IRON ARTICLES, COLD GALVANIZED.

quite well in a bath of the same composition. For this purpose there should be used in the acid bath pure lead sheets a sanodes or zinc sheets, while in the alkaline bath anodes of well conducting carbon and zinc sheets should be employed. As starting sheets for the subsequent electrolytic anodes, thin zinc sheets are hung as cathodes into a bath which is rich in metal. The deposition should be carried out with a strong current and in that manner anodes of considerable thickness are obtained in short time. For the acid bath it is advisable to use as anodes, instead of the zinc sheets, sheets of lead, and to cover them with a strong deposit of zinc. In the first place the lead sheets can be used over and over again, after the deposited zinc has been dissolved off. In the second place, the lead sheets always keep the reaction of the bath always sufficiently acid. Furthermore, when zinc-lead anodes are used there is always an equally large anode surface in the bath, and not to-day a large surface and after a short time nothing but pieces. It is well known that the zinc anodes are very quickly attacked at the edges and corroded and become continually smaller.

As I already mentioned above, zinc deposits from too acid solution easily detach themselves from the articles. A zinc bath with acid salts which has become neutral or alkaline does not, however, furnish such a beautiful light-gray colored deposit as an acidified bath. On the contrary, the deposit in the bath which has become neutral or alkaline is dark gray and blueish. This is the reason why in one day light-colored zinc deposits are obtained and the next day dark ones. It is, however, possible to influence the coloring of a deposit somewhat by the addition of chemicals. If a bath is employed which in the beginning, with an acid reaction, furnishes beautiful light gray deposits, but which after a few days works more slowly and gives a darker deposit, it is an indication that there is not a sufficient amount of free acid present in the bath. This state of affairs can also be recognized, when the anodes cover themselves strongly with the slime mentioned above. The necessary acid has then to be introduced into the bath, or recourse may be had to the use of lead anodes, which are hung into the bath beside the zinc anodes. It is also possible to use zinc-lead anodes, as mentioned above. It can be seen, therefore, that the nonsensical mixing and stirring of the bath with all kinds of chemicals can be dispensed with, if some forethought is used and the points about the anode are borne in mind.

If, however, too many of the lead anodes are used, the platers falls into the other extreme and the bath becomes too acid and too poor in metal in proportion. The acid which is set free in this case is not sufficiently taken up by soluble zinc, while, when only zinc anodes are used, more zinc is dissolved than the free acid can take up. If the zinc anodes are amalgamated with mercury the formation of slime does not manifest itself as strongly as without mercury. The latter also produces in the bath a lighter and whiter deposit. I should not, however, recommend the addition of mercury to a zinc bath, inasmuch as mercury does not only make the deposit, but also finer steel and iron goods, brittle.

Like in many branches of electro-plating there has also been a great deal of ridiculous secretiveness on the matter of cold galvanizing. All branches of industry, however, have only then obtained their highest development after they have been openly discussed in public. Already many years ago in Germany there have been granted several patents for zinc baths. Latter such patents were granted in England and some of them in America within late years. The patents do not differ in principle very essentially from each other. As the main constituents there are mentioned additions of chloride and sulphate of aluminum. These salts, however, have, in fact, no other purpose than to keep the bath acid for a longer time. This can be done better, however, by means of the anodes as explained above.

After the aluminum salt, which has been dissolved, has parted with its acid, which has become liberated during the process, it remains in the bath as an inactive ingredient, and makes the bath harder to manage in time and causes it to work gradually more slowly. Instead of using chloride of aluminum, it is just as good to employ hydrochloric or citric acid, and instead of the sulphate of aluminum one can use sulphuric acid and borac acid. With these more is gained than with the aluminum compounds, inasmuch as it has been proven for a considerable time that aluminum cannot be deposited by the current from waterly solution. In an English patent additions of carbohydrates are mentioned, which are claimed to prevent the sponginess of the deposit and to produce a finer structure. Experiments on a small scale have shown that this is correct. Dextrose is an essential constituent of the ready-made zinc baths, which can be purchased in the trade.

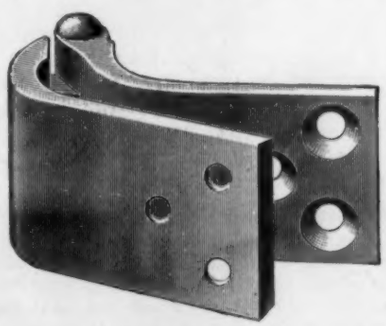
I will not conclude the discussion of these practical points for cold galvanizing before giving some hints as to the preparation of the articles before treating them in the bath. Smaller articles are best cleaned of all scale and oxide in tumbling barrels with wet, sharp sand. All

other goods have to be freed from oxide or scale by pickling them in dilute sulphuric or hydrofluoric acid. Articles which are covered with oil or other fatty materials have to be first cleaned in the potash solution and have then to be pickled. Too long a period of pickling is, however, of disadvantage, not only because some kinds of steel, especially wired, become brittle when pickled too long, but because the goods are pickled the more uneven the longer they remain in the acid. According to position the corners are more or less eaten off. The articles should not be left any longer in the acids after the scale and oxygen, etc., have become loose, but still adhere partly to the articles. The latter are then removed from the acids, rinsed with water and scrubbed with sand or pumice stone. The goods are then again rinsed in pure water and they are then brought into the cold galvanizing bath right away.

After the goods have received a sufficiently strong deposit of zinc, which can be done in 20 to 30 minutes, they are taken from the bath and immersed into boiling hot water until they have been heated up to that temperature. They are then suspended or placed where free access can be had to them. This concludes the process of cold galvanizing. It is, however, possible to scratch brush the galvanized articles either wet or dry with steel brushes. The goods look then very similar to polished steel. The process would, however, become too expensive for sheets, wires, hood iron, etc., if these goods had to be scrubbed with the hand brush. In order to make this branch of the industry, which is very important for the future, paying, apparatus are absolutely necessary which clean and plate the goods auotmatically. With such machines and with good baths it will be possible for the American manufacturer to obtain rust proof galvanic zinc deposit cheaper and better than in the melted bath.

WROUGHT BRASS HINGE.

An example of wrought brass work is herewith illustrated in the automobile hinge shown in cut. The automobile has made many requirements of the brass industry, and one of them has been a door hinge stronger than a cast one. In order to meet this demand the English & Mersick Company of New Haven, Conn., put on the market a hinge of wrought brass, and which they believe was the first one that has been made in this manner. The hinge is not stamped from thin sheet, but is wrought into shape from heavy stock, and it is claimed to be stiffer and stronger than either cast iron or cast brass.



With THE METAL INDUSTRY are incorporated THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW and THE ALUMINUM WORLD and BRASS AND COPPER INDUSTRIES.

THE COMPOUNDING AND MIXING OF MODERN LACQUERS AND THEIR USES.

By CHARLES H. PROCTOR.

Previous to ten or fifteen years ago the only lacquer in use as a protective coating against oxidization of nonferrous polished or plated metals consisted of a body of resinous gums dissolved in pure alcohol, and sold principally under the name of French varnish. This lacquer was applied to the heated metal at a temperature of 100 degrees, or more, owing to the rapid evaporation of the solvent, which, if applied cold, would absorb atmospheric moisture and become white and waxy. Hence, the coating would be entirely spoiled. But, as we have advanced in knowledge, other liquids have been discovered that can be used to advantage as a reducer or thinner in connection with French varnish, allowing it to be applied cold and dried in the air if necessary, without the use of heat. Hence, this varnish lacquer remains one of the best of its kind to-day, and compounded and mixed with other substances to be mentioned hereafter, forms one of the principal bases of the modern lacquers. Near the time mentioned at the beginning of this article, there appeared in the trade a new protective coating for polished and plated metals under the name of "Zapon." According to the analysis of Buchner at that time, it consisted essentially of celluloid in a mixture of amyl acetate and acetone, the latter being used as a solvent. This compound was the forerunner of all the splendid lacquers of the colorless varieties of to-day, which enable silver manufacturers to coat their goods with an almost invisible protective coating, allowing them to make and carry in stock goods that, under previous conditions, would deteriorate in value on account of the rapid oxidization of the surface. Experience has taught us that it is not necessary to use celluloid in the production of transparent lacquers, but only one of its constituents with a solvent, the other materials of which it consists being entirely superfluous for use in making lacquers.

It is a well-known fact that all lacquers dried under the influence of heat produce better results than those dried in the air, especially gold-colored lacquer. The temperature may range all the way from 100 to 180 degrees F. without deterioration, although silver and silverplated articles are liable to assume a pinkish shade when heated too long and at too high a temperature. Ovens heated by steam coils give the best results, although the writer used for many years a steam jacketed iron plate with wooden frames covered with iron wire. The mesh of the latter was of various sizes according to the kind of work to be dried, and nothing more than common wrapping paper was used as a covering to help retain the heat. Brushes of various sizes are used in applying brush lacquers, the best for the purpose, in the writer's experience being those known as Fitch varnish brushes with the hair set in vulcanized rubber. These cost slightly more than the common kind but they last longer and give better results, shedding very few hairs, which is one of the troubles a lacquerer has to contend with. Camel's hair or badger's hair brushes are advantageously used in applying gold lacquers or dead black lacquers on highly polished flat surfaces. I would here remark that where it is possible to apply lacquers by dipping, it is advisable to do so, as in my experience they give best results.

The best dip lacquer for all polished or unpolished surfaces, plated or otherwise, of gold, silver, copper or brass, which I will call No. 1 Dip, is made as follows:

Take 6 ounces of pyroxlin or soluble cotton, and dis-

solve in 1 gallon of amyl acetate. Agitate frequently. In ten or twelve hours this will become a semi-transparent body, water white, of the consistency of photographer's collodion, and is sold under the name of "amyl acetate collodion." This material forms the body of the lacquer. Now take one part amyl acetate, two parts fusel oil and one part benzine and mix them in the order written. This is the thinner or reducer. Add equal parts of the body to the thinner, which will produce one of the best dip lacquers of the colorless variety. It is dipped cold and will dry in the air, but results are better if dried at a temperature of 110 degrees.

Brush lacquer No. 2 is suitable for all polished gold, silver, copper and brass goods, plated or otherwise. This lacquer is made in the same manner as No. 1 dip, one one-half part of the thinner is used with an addition of 4 to 6 ounces white French varnish to each gallon of lacquer. This makes one of the best brush lacquers of the colorless variety. It is applied cold and will dry in the air, but best results are obtained at 110 degrees.

Dip lacquer No. 3. This lacquer is applicable to oxidized or polished nickel surfaces, plated or otherwise, that need more body owing to reflection of transmitted light, which produces prismatic colors on some oxidized surfaces. It is prepared by taking the formula as given for No. 1 dip, with thinner added, and adding to each gallon 16 ounces white French varnish. This is one of the best lacquers for the above purposes and is applied and dried as above.

Brush lacquer No. 4 is of the same order as No. 3 and used for the same purposes, but with an addition of 32 ounces of French varnish to each gallon. It is applied as in the preceding formula and dried at the same temperature and is unsurpassed by any other lacquer for the above purposes.

No. 5. French varnish dip lacquer. This lacquer will be found the best for all classes of dipped brass goods, such as lamp burners, clock movements, chains and various other goods that contain perforations and are liable to stick together in drying, for basket dipping or for lacquering directly from the boiling rinsing water without using drying out material. Take one part of brown French varnish as a body. Use as a thinner one part of amyl acetate, two parts fusel oil and one part benzine as directed in formula No. 1. Use three to four parts of thinner to one part of varnish. Drain well after lacqeuring and dry at a temperature of 150 to 180 degrees.

No. 6. French varnish brush lacquer. This lacquer is adapted to all classes of polished, oxidized or brush finished surfaces, plated or otherwise, other than gold or silver. Where a good body is desired, it gives beautiful results, enriching the surface to which it is applied. Brown French varnish forms the body, equal parts of amyl acetate and fusel oil are used as a thinner, of which take two parts to one part of varnish. Apply cold and dry at temperature of 150 to 180 degrees.

No. 7 French varnish brush lacquer, for producing the well-known English brass bedstead gold lacquer. To one part of white French varnish add one part of fusel oil. The gold color is produced by concentrating Aurin aniline (or Golden Yellow) in fusel oil, adding as much as possible by agitation until a highly concentrated solution is produced. Add as much coloring matter as necessary to obtain the desired depth of tone, as light, medium and deep orange gold can be obtained by adding more or less of this color. This gives the heavy body desired on brass bedstead work for its wearing qualities. It can also be used on all classes of polished brass or brass-plated goods and will give splendid results approaching the color of natural gold so near that it is impossible to tell the difference by an experienced eye. This lacquer is applied cold with a Fitch varnish brush for uneven surfaces. For highly polished flat surfaces a camel's hair or badger's hair brush will be found most satisfactory. Temperature for drying, 150 to 180 degrees.

Another good gold lacquer that will give splendid results on chandelier work, lamps and art goods, whether made from brass or brass-plated, may also be made by adding a small proportion of gold color as used in No. 7 Brush Lacquer, to No. 4 Brush Lacquer with thinner added. This is applied cold and dries rapidly at 100 or 110 degrees.

As a rule, best results are obtained by applying gold colors by the brush method, yet there is a process, part lacquering and part dyeing that is used by some concerns in the novelty business and is well adapted to give an imitation of gilt work on buttons, buckles and other small goods, whether made from polished brass or brass-plated, and which may be produced as follows: After the goods have been polished and cleaned, or acid-dipped if made from brass, and a satin-gold is desired, they are strung on frames or wires as desired and lacquered in formula No. 2. This gives a good body. After thoroughly drying they are immersed for an instant in the coloring fluid, which latter dyes the lacquer and gives the gold color. The coloring fluid is made from fusel oil to which a sufficient amount of gold color, mentioned in formula No. 7, has been added. To give the desired results, the articles after passing through the gold dye, are washed in clear cold water and placed in the oven to dry at a temperature of not over 110 degrees.

Various colored lacquers may be produced by using aniline colors soluble in fusel oil or alcohol, concentrating them as mentioned in formula No. 7, and using brush lacquer No. 4 as a base. Dead black lacquers can be made in the same manner by using refined lampblack in connection with No. 4 lacquer as a base.

No. 1 lacquer can be used as a bronzing liquid for all bronze colors by using bronzing powders and the thinner when necessary.

Bodies and thinners may be added when necessary to any of the preceding formulas. Too thin a lacquer shows prismatic colors, and this will also occur when goods are not thoroughly cleaned before lacquering. Too concentrated lacquers give gummy effects. I do not deem it necessary to go into the details of cleaning goods before lacquering, as each plater, polisher and lacquerer has his own particular way of cleaning his goods, and no doubt thinks it the best.

Note. The French varnish mentioned in this article is cut in wood alcohol, not grain alcohol, and costs more than one-half the regular price of French varnish cut in grain alcohol. When heavier bodies are desired in lacquering, French varnish may be added up to equal parts of varnish and amyl acetate colodion with thinner added. It is not customary to use benzine in making lacquers, but when used in the proportions mentioned with the other ingredients, it gives the best of results.

There seems to be particular interest among platers at the present time in the plating of aluminum. THE METAL INDUSTRY has recently received a number of samples of plated work, some of which looked very well. The various methods used for plating the aluminum have been described in these columns a number of times.

MOLDING BRONZE STATUES IN FRENCH SAND.

By Ernest C. Cheel.

In the following I will describe in substance the mode of procedure in molding with French sand, minus, of course, the thousand intricacies and points gained from experience, which cannot be enumerated here.

The first step in making a statute is the production of the plaster model. This is supplied by the artist, and it comes from his studio in the exact size required for the final statue. The original studies in the case of colossal statues may be very small, but before the artist is done with his work the full-sized model is produced. The area of the flask, of course, is governed by the size of the plaster model of the statue.

This statue of General Warren, erected in Boston, Mass., was modeled in Paris by Paul W. Bartlett, sculptor, and cast at The Henry-Bonnard Bronze Works, New York; Eugene F. Aucaigne, master founder.

The model is placed in the lower section of the flask, and the work of building up the mold begins. The sand used is mined in France, and possesses to a high degree the property of consolidating, yet is very porous. A famous bed of the material is at Fontenay-aux Roses, about 16 miles from Paris. The sand is compacted by wooden mallets and hand rammers of different shapes. As the artist produces his statue without any reference to its capacity for "drawing" from the mold, the bronze founder has to adapt his work to the most exacting conditions of undercutting and complicated outlines.

The mold is, therefore, built up in very numerous sections, some of them extremely small. There are as many as a thousand to fifteen hundred pieces of molding in a statue at times, due to the undercutting, when a very intricate work is being executed, which are similar to irregularly shaped bricks. These sections must be fitted together with the utmost nicety and accuracy. The mold then has to be opened up, the edifice of over a thousand pieces is carefully taken down and the model is lifted from its resting place upon the lower flask section. The mold is next rebuilt, the inner surface receiving a coating of foundry facing and the interior is rammed full of clay to form the core. This core need not be solid and some spaces may be left in it for the gases to collect in. Thus the mold is again complete and intact, but is filled with a clay figure instead of a plaster one.

The mold is then dismantled a second time and the core is taken in hand. From its entire surface a layer of clay is removed, to average, as nearly as possible, one-quarter of an inch in depth. This delicate operation provides the space for the metal to occupy in the casting process. The core thus reduced in size is replaced upon the flask and is properly supported. The mold is then built up a second time, surrounding in this case the reduced core. A number of channels or gates are worked in the mold to allow the metal to run through to different parts of the figure. These resemble somewhat the trunk and branches of a tree. They start with a comparatively large section near the pouring reservoir, and fork and diminish repeatedly, reaching the space between core and mold in many places. When all is perfectly dry, and the flask filled with sand so as to hold all the pieces in place, the operation of casting is proceeded with. In many cases as long as seventeen weeks are required in which to execute the molding, but, of course, an equestrian statue takes very much longer.

THE AMOUNT OF SILICON COPPER.

In the July number of The Metal Industry there was published an interesting article written by Mr. W. J. Reardon on "Silicon Copper in the Brass Foundry," in which Mr. Reardon gave his experience, covering many years of his use of silicon-copper. As an appendage we herewith print directions regarding the quantity of silicon-copper to use in making sound copper castings.

In making pure copper castings the amount of silicon-copper necessary to add depends upon the quality of the copper. For lake or a good grade of electrolytic copper one pound of silicon-copper is usually sufficient to 100 pounds of copper. This amount introduces one-tenth of 1 per cent. of silicon. When scrap or a casting brand of copper is used it is necessary to add more of the silicon-copper, as much as 2 or 2½ pounds per 100 pounds. For brass castings as little as 2 ounces for 100 pounds is used, and from that amount up to 8 ounces for tin-bronze alloys.

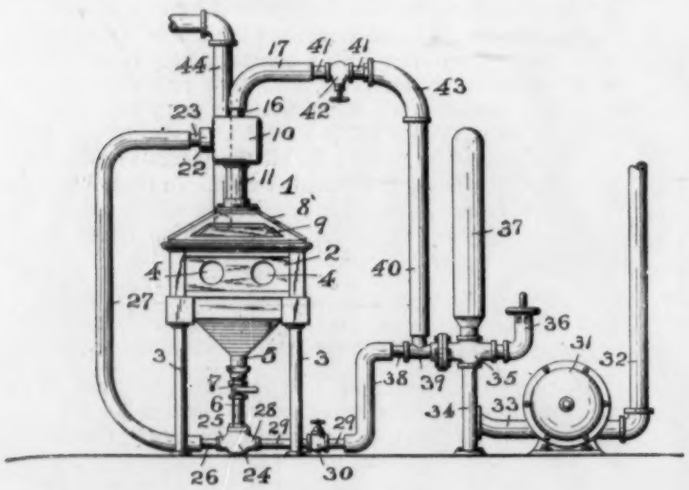
THE ALUMINUM INDUSTRY.

The chief point of interest affecting the aluminum industry in the United States during the year 1903 was the final adjudication of the litigations between the Electric Smelting and Aluminum Company of Cleveland and the Pittsburg Reduction Company, which ended with a victory of the former. The readers of The Metal Industry are familiar with the terms of settlement of this case, by which the Electric Smelting and Aluminum Company apparently now controls the electric smelting industry in the United States.

Despite the increasing demand for aluminum, due to the extension of its uses both as metal and as alloys, the price per pound has continued practically stationary throughout the years 1901, 1902 and 1903. The price of ingot aluminum during 1903 was adjusted by an agreement between all of the aluminum producers in the world.

NEW SAND BLAST APPARATUS.

In the last few months THE METAL INDUSTRY has shown "The Use of the Sand Blast in the Plating Room," and also illustrated and described several types of sand blast suitable for metal working shops. The accompanying cut shows a form of sand blast apparatus which has just been patented by William R. King (No. 794,507, July 11, 1905), and assigned to the Hanson & Van Winkle Company, Newark, N. J. The object of the invention is to provide one device for conveying and abrading material and another device for conducting a jet of air or forcing medium to the abrading material and then under pressure accelerating the movement of the blast either in a single stream or otherwise upon the surface which is to be treated. The mixing device consists essentially of a suitable box 10 from which leads the tube



A NEW SAND BLAST.

11, into the dome shaped compartment, 8, into which the articles to be blasted are placed. In operating the blast the regulator valve, 7, is opened and the blower, 31, is set in motion. Immediately air is forced through the pipes into the ejector, 24, and into the box, 10, thence into the machine. The sand or any other abrading material at once passes from chamber 2 through pipe 6 and again into the ejector, 24, which takes up the abrading material and flows it through pipes 26, 27. The inventor states that in his blast he has provided a means for conveying an abrading material in which a complete mixture of the material with a forcing medium is produced under greatly accelerated motion, thereby producing the results long sought after in the art of sand blasting.

LEAD PRODUCTION FOR 1904.

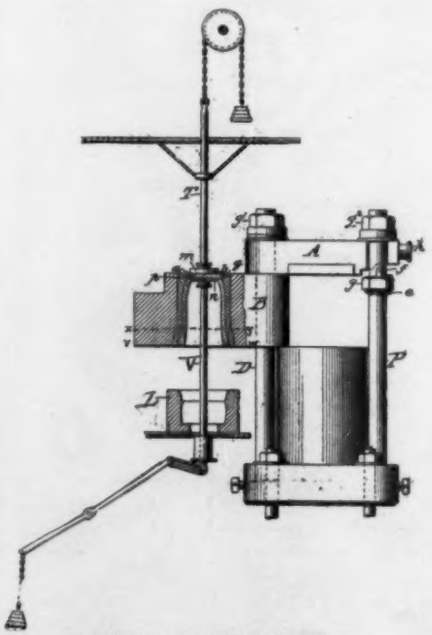
According to figures compiled by the United States Geological Survey, the total production of pig lead in this country during 1904 amounted to 89,169 tons of soft lead and 315,284 tons of desilverized lead. Direct returns from smelters indicates that 92,341 tons was obtained from foreign sources. The merchant lead produced from the United States mines during 1904 is stated to be 307,000 short tons.

Metal covered lace is used for a variety of purposes, such as for table ornamentation, centre pieces, upholstery hangings and mural decorations, ecclesiastical vestments and ball and evening dresses, etc.

NEW METHOD OF MAKING CRUCIBLES.

A new method of manufacturing crucibles has just been patented (No. 792,452, June 13, 1905), by A. L. J. Queneau, a mining engineer and metallurgist of South Bethlehem, Pa., and the consulting engineer of the New Jersey Zinc Company. Mr. Queneau's invention consists of a power press for the making of crucibles under pressure, the upper portion of which press with the mold section swung open is shown in the cut. Mr. Queneau sends us the following particulars about his invention:

"I am having a crucible press made in order to manufacture crucibles according to my process. The physical structure of the press made presents the same felting of



A NEW CRUCIBLE PRESS.

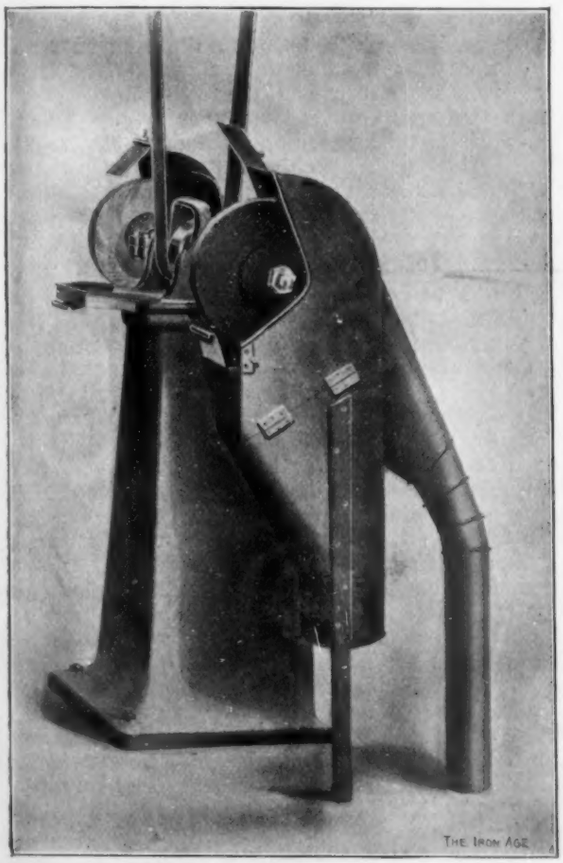
the graphite flakes that is so apparent in the hand-made crucibles. On account of their much increased density the life of the crucible is greatly extended. The vessels can be manufactured at a less cost than the hand-made vessels. Thus a cheaper and better article is produced. The same press can be used to manufacture composite wall crucibles according to my process, covered by U. S. patents Nos. 789,451, 789,453.

"The object of the process is to make a vessel more refractory to cutting slags than the usual crucible. The New Jersey Zinc Company has been using the process in its various works for the manufacture of retorts and muffles for zinc furnaces. The life of these retorts has been found greatly increased, besides other advantages such as decreased amount of metals soaking in the walls of the retorts. In manufacturing the crucibles we have made use of graphite, chromite, beauxite and siloxicon as refractories. Graphite, the Ceylon grade, has been used to the greatest extent."

Osmon, a new fuel, is made from peat. The peat used contains 90 per cent. of water, of which 20 to 25 per cent. is removed by means of an electric current. The peat is then further dried and passed through a machine which breaks it up and forms it into briquettes or nut-shaped pieces. Osmon is free from sulphur and burns without slag or smoke.

EXHAUST APPARATUS.

The polishing and grinding departments of the large manufacturers of metal goods have found how important it is for the health of their workmen to carry away the grindings and buffings which accumulates in the grinding and polishing of metals, and the accompanying cut shows a special type of exhaust hood for grinding and polishing wheels the patent for which is controlled by the B. F. Sturtevant Company, of Boston, Mass. Its special feature consists of a receptacle to catch the particles of solid matter passing from the wheel. The suction being controlled so that it is not quite sufficient to draw



EXHAUST HOOD.

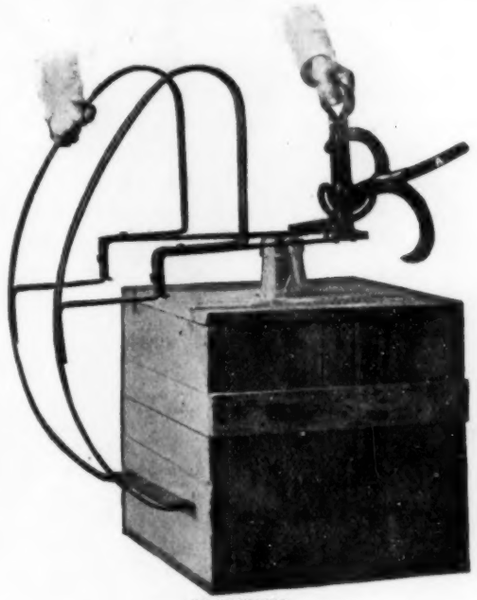
them away, these particles fall to the bottom and are there collected, while the practically free air passes through a collector where the least vestage of dust is removed. The receptacle can be readily emptied when it becomes filled, and its use avoids excessive wear on the exhaust fan, piping and collector.

The hood is so designed with hinges and clips that the wheel may be readily removed or adjusted to fit the wheel as it wears to a smaller diameter. The outlet is connected to the exhaust fan, and a shield, a swivel plate and an extension slide may be adjusted so as to more fully enclose the wheel and prevent the discharge of particles into the room.

According to John Plummer of Sydney, New South Wales, Australia is looming up as a silver producing country. The estimated value of product for 1903 being £1,177,177. In 1904 there was an increase of production in New South Wales, the exports from that state alone reaching the record value of £2,065,540.

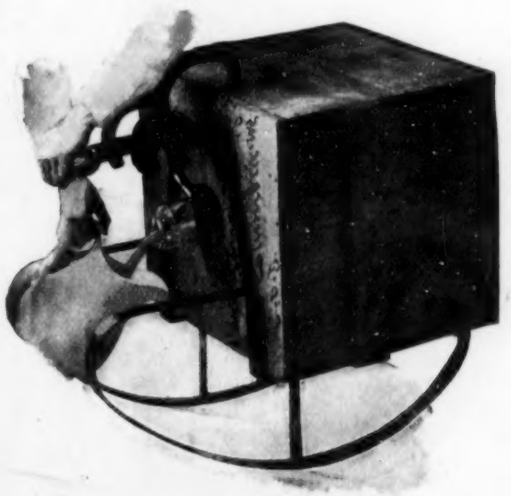
CARBOY INCLINATOR.

A simple device by which a carboy of acid can be tilted and its contents poured with slight exertion and safety from spilling and splashing is shown in the cuts. The "Flaherty" inclinator, as it is called, can be clamped or



CLAMPING.

taken off of a carboy in short order, and the manufacturers state that it is strongly built. All the cast parts are of malleable iron. The inclinator works with a cam action and clamps on like a skate. It is of moderate cost, and no doubt is a useful piece of apparatus for every



POURING.

plating room and every metal working establishment using acids. It was recently put on the market by the Carboy Inclinator Company, Philadelphia, Pa. The company writes us that 1,100 of them are already in use.

Agitation is being carried on for the purpose of securing a reduction in the tax on alcohol to be used for industrial purposes.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York.

Q.—We have a lot of brass borings and scrap sheet brass, the off-fall from out stamping presses and drilling stock. Also some scrap copper, the off-fall from reflectors made from best quality of copper. We propose to make cast hinges, thumb screws, door latches and such articles that are put on headlights and then painted. Will THE METAL INDUSTRY send us a suitable mixture for this purpose and one which will use up our scrap?

A.—The following formula, based on a 100 per cent. mixture, should produce an alloy satisfactory for the purpose mentioned:

	Per cent.
Copper scrap	38
Sheet brass scrap	26.5
Rod brass scrap	26.5
Zinc	6
Tin	1
Phosphor-tin	0.5
Lead	1.5

In the remelting of alloys there is always a shrinkage. Therefore, it would be necessary to add zinc and tin to give a good solid casting. In making this mixture the copper should be melted first, then add sheet brass, rod brass, zinc, tin, lead and phosphor-tin. When the crucible is taken from the fire stir the mixture well and keep covered with powdered charcoal. Pour at as low a heat as possible consistent with proper fluidity. It is advisable to concentrate your scrap as much as possible by cabbaging either with a cabbaging press or with an iron mold and a sledge hammer.

Q.—A gold, silver and bronze caster asks what is used to save or protect the lining of gas furnaces from the intense heat, also some other product than bone ash to prevent the crucible from sticking to the bottom of the furnace. Also what firm sells blocks upon which the crucibles rest.

A.—The best way to prevent the crucible from sticking to the bottom of your furnace is not to let it slop over. Care should be exercised in throwing the fluxes into your melting pot. Bone ash is considered as good a material as anything when the metal does slop over. Gas furnaces are lined with as refractory a lining as the manufacturers probably know of. A new refractory substance is carborundum fire sand. The American Gas Company of New York city sell the crucible blocks used in a gas furnace.

Q.—A plating works asks how to refine scrap tin solder. The solder consists of three parts lead, one part tin, and in their work of filling molding they make a lot of dross which, when remelted, becomes very brittle.

A.—Our opinion is that by using a few sticks of charcoal and a little borax you will diminish the dross. There will, of course, be some slag, which you should skim off, but the charcoal and borax will lessen the amount. We take it that your trouble is in not reducing enough, which means too much oxide in the metal.

Q.—What is the best formula for fusible solder? We wish a mixture that will melt in 160 degrees.

A.—A formula that is recommended consists of the following: Bismuth, 4 parts; lead, 2 parts; tin, 1 part; cadmium, 1 part. This melts at 141 degrees Fahrenheit. By diminishing the cadmium and bismuth you will raise the melting point to 160 degrees. You can determine this with a little experimenting. Cadmium, which is expensive, can be diminished one-half.

Q.—I get some valuable hints from THE METAL INDUSTRY and greatly appreciate the articles which are so plainly written as to be readily understood. Could you tell me through your Correspondence Department if a black nickel finish is suitable for blacking brass stops for cameras, and if not, what should be used so as not to affect the sensitive plates.

A.—The black nickel finish transmits prismatic light to a certain extent, although it might answer the purpose. If not, see article in the May number of THE METAL INDUSTRY entitled "Ammonia Copper Solution." Your work can be done with this solution by using copper wire and common white china buttons between the work or a frame made for the purpose might be applied to advantage. After coloring and drying out apply a dead black lacquer. This gives excellent results and can be dipped on. This lacquer dries hard with a smooth dead lustre, which is very suitable for the purpose.

Q.—We have difficulty in bright nickeling steel chains. Can you advise us what to do in order that the chains may come out bright and not discolor when dried in sawdust?

A.—We should say your nickel solution is either poor in nickel or alkaline, for in either case brown stains are formed on the goods in such condition when dried out. We would advise as follows: First add one to two ounces single sulphate of nickel dissolved in boiling hot water for each gallon of solution in use. If this improves your solution add as a conducting salt 10 ounces of commercial sulphuric acid for each 100 gallons of solution. Stir this in well and then add 30 ounces of 26 per cent. water ammonia for each 10 ounces of acid used. (See article in the May number of THE METAL INDUSTRY on "Replenishing the Nickel Bath.") Stir in well and allow your solution to settle. In drying out use a solution of plater's compound 2 ounces to each gallon of water used. Keep this cold, wash your work in water in the usual manner, immerse in the compound solution for a moment, rinse through boiling water and dry in maple sawdust. The compound will dry your goods quickly, giving better results and saving sawdust.

Q.—Can you furnish a recipe for an up-to-date "Soldering Fluid or Flux" not made of muriatic acid and

A.—A recipe for tin is ½ oz. common resin dissolved in a half pint of amyl acetate. For brass equal parts of alcohol and glycerine with as much sal ammoniac as the compound will take up. This is used the same as the other soldering fluids.

Q.—Can THE METAL INDUSTRY inform me how I may obtain antique finishes on small bronze heads without plating?

A.—You do not mention the kind of antique finishes desired. For antique bronze use 4 oz. sulphuret of potassium, 4 per cent. ammonia to each gallon of water. Use very hot. This will give a color similar to the oxidized copper. Relieve by pumice stone and the hand or tampico wheel for a dead lustre. On the buff wheel for a bright lustre. Various antique greens may be applied by the method mentioned in the January number 1905 of THE METAL INDUSTRY. This consists of lacquering the article with French varnish lacquer (cut in wood alcohol), using one part lacquer to two parts of thinner, consisting of equal parts of amyl acetate and

CORRESPONDENCE DEPARTMENT

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fusel oil and apply with a brush or by dipping. Dry for a few minutes and apply any color made up from chrome green, chrome yellow, zinc white, soluble blue and lamp black. Mix a little of your color first to give the desired shade and then apply to the lacquered surface. The dry colors should be mixed with a good quality of turpentine to the consistency of very thin paint. Dry the article for a few moments and relieve with a little turpentine on the high grounds. Then retouch with an almost dry lacquer, brush and dry again. For very dark antique effects it is well to pass through the sulphuret potassium solution. First dry and lacquer this gives a black background. Apply blue or yellowish greens with a little lamp black added. Acids greens are produced by using ½ pound sulphate copper, ½ pound salammoniac, 3 pints of water. This is used boiling. Immerse for three or four minutes, wash or dry in the air after the green appears. Rub olive oil lightly over the surface.

Q.—A plater asks the best way of overcoming the sweating of metals after plating. He has been troubled in this respect with both his copper and brass solutions, a liquid oozing out after the article has been exposed to the air for an hour or more. He has tried acid dips with little success, has added bisulphide of soda with no better results. His troubles began with the coming of Summer.

A.—Your trouble is not unusual at this time of the year, especially when the atmosphere is charged with humidity. After washing your articles well in cold and boiling water make up a solution of cream of tartar (or red dryols, which is crude cream of tarter), 2 oz. to a gallon. Have this boiling and immerse your plated articles in this for 10 or 15 minutes. This will neutralize the metallic cyanides in the pores of the metal. Wash thoroughly in boiling water and dry on a heater to absorb the moisture in the pores. This should stop your trouble, but another remedy is to lay each day's work aside for at least a week after thoroughly washing. All the metallic cyanides will have spotted out in this time. Afterwards place rapidly through a bright dipping bath and wash in the usual manner. This method is used by a good many concerns. In the November 1904 issue of THE METAL INDUSTRY, page 187, there is a short article which has given very good results, especially when dried in a heater after immersion.

Q.—A bicycle manufacturer asks for the formula for the black iron finish on brass fixtures.

A.—Use the same solution given in the May number 1905 of THE METAL INDUSTRY. Use this for darkening your brass work, then apply a dead black lacquer, which may be put on with a camel's hair brush or by dipping in the lacquer. Afterward dry with a moderate heat. This is the method used on all brass goods and is known as the "Venetian iron finish." There are a number of makes on the market of the dead black lacquer.

Q.—I am now making cast iron to supply the die makers. When using small quantities of iron my castings are perfect, but as I increase the amount of iron the smoothness of the facings decreases. Can you suggest anything which will remedy this defect. I bake my molds and use French sand.

A.—Try double facing your molds or use finely divided graphite or lycopodium. For your larger castings pour your metal as low down as possible for fusion. Your trouble is probably caused from too much heat on the larger castings causing the face of your molds to burn through.

Q.—Can you advise us what is the composition known as Lumen metal, used in place of brass for machinery bearings?

A.—The following is an analysis of this metal, which was made by the government:

	Per cent.
Zinc	82.52
Copper	9.10
Aluminum	7.68
Lead	0.50
Tin	0.15

A cast bar 1.129 inches in diameter was tested for strength and gave the following results, viz.:

Tensile strength per square inch, 20,300 pounds.

Elongation in 4 inches, 0.5 per cent.

Reduction in area, not appreciable.

Q.—A brass company asks for the best mixture for small light yellow brass castings and the best method of molding them.

A.—A good and cheap mixture is as follows: Copper, 10 pounds; zinc, 4 pounds; lead, 5 ounces; tin, 3 ounces. This will give an excellent alloy and one which will cut freely. If not stiff enough add more tin, but this will harden it so that it will not cut as well. The best method of using yellow brass scrap such as chips, etc., is to melt them down and run into ingots. If run into castings the result is not as good. By remelting the ingot good castings may be secured. If the chips are from screw rod it will not be safe to add any more lead. The difficulty in the use of scrap is that it is impossible to tell what the mixture is. If the castings made from the scrap do not cut freely add more lead. Add about 2 pounds of spelter to 100 pounds of metal every time the melting is made to compensate for the loss. The method of molding light yellow brass castings was described in the January number 1905 of THE METAL INDUSTRY.

READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing, rolling and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

BETTER EVERY ISSUE.

THE METAL INDUSTRY:

Gentlemen—After reading the June and July issues of THE METAL INDUSTRY I must write you at once that every new issue is better than the last, and that is saying a great deal. I have had over thirty years experience in the casting and the rolling of all kinds of metals and never have seen a journal which is so valuable to metal founders, workers and platers as THE METAL INDUSTRY.

I hope your journal continues to grow and has the success which it deserves. THOMAS CLARE.

THE METAL INDUSTRY is the first journal in the world to be published in the interest of the non-ferrous metals. Devoted to all of the non-ferrous metals and alloys since January, 1903; to the aluminum, brass and copper industries since October, 1894.

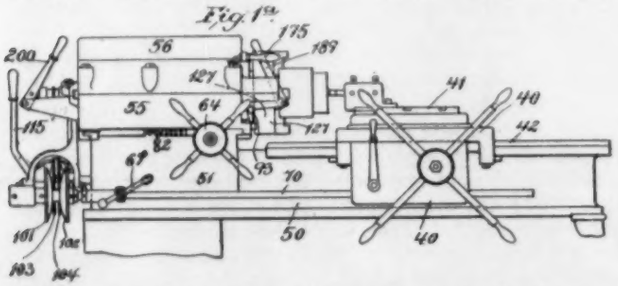
PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York.

792,307 June 13, 1905. PROCESS OF ELECTRODEPOSITING ANTIMONY. A. G. Betts, Troy, N. Y. This invention consists, partly, in electrodepositing antimony from solutions containing antimony trifluoride, using either antimony anodes or insoluble anodes..

792,070. June 13, 1905. PROCESS OF HARDENING AND TEMPERING COPPER. Carrie R. Palmer, Seattle, Wash.—This invention relates to a process for hardening copper and the alloys of copper, and is claimed to comprise subjecting copper or alloys of copper to heat of a high temperature, and while in a heated condition subjecting the same to the action of sulphate of copper (blue vitriol), then partially cooling, and then subjecting it to the action of sulphur.

792,591. June 20, 1905. METAL WORKING MACHINE. J. Hartness, Springfield, Vt.—The object of this invention is to provide, first, a head having power-transmitting mechanism for effecting a differential rotation of the spindle from a constantly



rotated power-shaft, with controlling means whereby the speed of rotation of the spindle may be graded from a relatively low speed to a relatively high speed, and vice versa.

787,758. April 18, 1905. PROCESS OF TREATING PRODUCTS CONTAINING VANADIUM, MOLYBDENUM, TITANIUM AND TUNGSTEN. H. L. Herrenschmidt, Le Genest, France. The process aims at obtaining alloys of vanadium with metals such as nickel, copper, iron, etc. It is also applicable to the production of alloys of molybdenum, titanium or tungsten with the above metals. It consists, when applied to vanadium, in first obtaining a vanadate of soda liquor by evaporation and crystallization. If then an alloy of vanadium and nickel is desired, the vanadium contained in the alkaline vanadate is precipitated with sulphate of nickel, the product dried, washed and calcined. The product then constitutes a material suitable for making vanadium nickel, either in the electric furnace or by reduction by aluminum. The alloy may also be obtained by mixing the material with a reducing agent such as carbon, tar, etc., which mixture is subsequently agglomerated and heated.

787,742. April 18, 1905. METHOD OF WELDING. Otto Eigen, Duisburg, Germany. The process is especially adapted for the manufacture of welded chains and consists in beveling the extremities of the bars or the like to be welded together, heating them to welding heat and submitting them to the action of two pressure rolls which rotate in the same direction, so that the ends of the parts to be welded are pressed against each other both in the longitudinal direction and transversely.

788,119. April 25, 1905. HYDRAULIC TUBE EXPANDING AND COMPRESSING MACHINERY. A. T. Pope, Louisville, Ky. The machine expands short tube sections to the form of a sphere or the like and the length of the tube is simultaneously shortened, so that the thickness of the wall of the expanded section remains substantially the same as that of the non-expanded portion. The tube, and a chamber back of it, is filled with water, which is then forced by a piston into the tube, while at the same time two shells which surround the tube and are shaped according to the form the expanded part of the tube is intended to have, are slowly moved towards each other. The material of which the tube is composed, such as copper, brass, soft iron or lead, will then assume the shape of the shells and will be shortened in length at the same time. The mechanical construction of the machine is described in the specification.

794,168. July 11, 1905. METHOD OF REMOVING SUPERFLUOUS METAL COATING FROM SHEET METAL. O. S. Fellows and A. E. Hopkins, Middletown, N. Y. The object of this process is to save the list or excess of metallic coating and at the same time to render all parts of the coated sheet, including the selvage edge, available for practical use, the plate being thus perfected and rendered more valuable commercially and otherwise.

794,169, issued on the same date to the same inventors, covers a modification of the process.

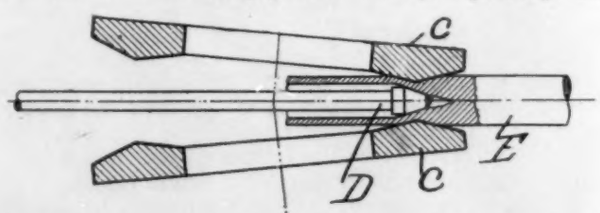
794,704 and 794,705, issued on the same date to the same inventors, are designed to cover the apparatus, by means of which the processes are carried into effect.

792,826. June 20, 1905. METHOD OF COATING MATERIALS WITH SILVER. Fritz Hilpert, Nuremberg, Germany.—The object of this process is to provide a glazed shining surface of silver or other precious metal to paper, leather, or similar material either in an even form or in different colored patterns.

793,067. June 27, 1905. METAL MOLD FOR MAKING BRASS CASTINGS. F. Haggenjos, St. Louis, Mo.—This patent claims the combination, in a mold, for making brass castings, of a central, old-cavity section, to which is jointed and pinned an upper and lesser perforated core-cavity section provided with hard-sand fillings the said upper section being divided through its central gate-opening to the mold.

793,068, issued on the same date to the same inventor, claims the cages or frames seated in and hinged to the sides of the center mold-section, and provided with hard-sand fillings held in beveled seatings with turn-buttons and a central gate opening into the casting cavity.

787,612. April 18, 1905. METHOD OF SHAPING METALLIC INGOTS BY TRANSVERSE ROLLING. L. D. Davis, Erie, Pa. The inventor has found that the disadvantages experienced in transverse rolling may be overcome by first piercing the ingot and then subjecting it to the transverse rolling process. The opening through the



ingot is preferably produced by pressure rotatively applied with a feeding action of the ingot upon a mandrel. The figure shows a horizontal section on the axis of the billet of a piercing mill, in which CC mark the disks which are common to piercing mills, D the mandrel and E the billet. The billet is fed through by the action of the rolls and is pierced, the mandrel smoothing and compacting the walls of the opening formed.

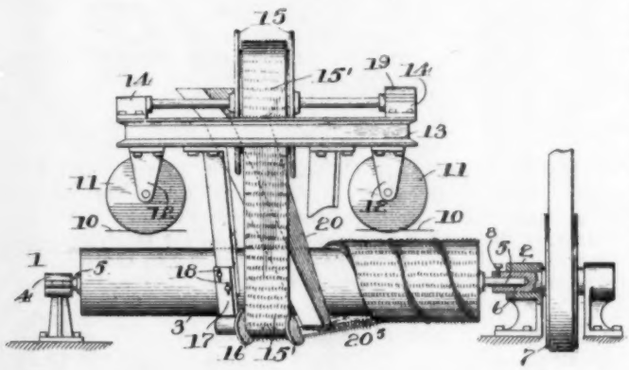
784,535, March 14, 1905. MOLDING MACHINE.—H. A. Battenfeld, Cleveland, Ohio. The bed of the molding machine has a press-bed plate with a central opening, above which is located a stripping plate with openings through which the pattern members are moved up into the flask and through which they are withdrawn when the sand has been compressed around them. In the operation of the machine the flask is placed upon the stripping plate and the patterns are forced up into position. The bed is then shifted by a suitable mechanism, so that the flask travels under a hopper, from which it is filled with sand, after which the bed returns under the press. The press, which is arranged above the flask, then descends and the presser board which the press plate carries on its under side, compacts the sand in the flask. The presser board has in the meantime been released. The power mchanism then conveys the main bed forward, where it stops in a position for the flask to be removed by the operator, the presser board having traveled forward with it and the presser plate moving upward to its original position. The operator then removes the flask with the presser board in place, after having first withdrawn the pattern members by the mechanism arranged for that purpose.

PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

793,307. June 27, 1905. ART OF SHEET METAL WORKING. M. Lachman, London, England. This patent claims the method of securing bodies to sheet metal, which consists in forming an undercut recess in the face of the body, forming a cup on the face of the sheet metal, and expanding said cup in said undercut recess and forming a retaining-piece inside said cup and recess, the edges of said retaining-piece being wholly within the periphery of said cup.

787,451. April 18, 1905. CORE ELEMENT. R. G. James, Louisville, Ky. The invention relates more specially to cores used for casting tubes or cylindrical vessels. The core element is formed of a core bar, about which a layer of sand is placed, which is held in position by a spirally wound ribbon of suitable



width. Around this is placed a layer of plastic loam, composed of 25 per cent clay and 75 per cent sand. The apparatus comprises the core bar 3, about which the ribbon 15^1 of cheese cloth is being wound. The material which is to compose the loose layer of the core is fed through a chute upon the ribbon as it advances. The layer of loam is then put on the outside and the whole baked. It is then placed into the mold, after a coating of facing has been applied. The outer layer of plastic loam will prevent the heat of the hot metal from immediately penetrating to the first layer of material upon the core, but when the metal has sufficiently set, the cheese cloth will have become disintegrated and the layer of sand will therefore become loose, so that the core bar can be taken out and used over again.

793,895. July 4, 1905. MACHINE FOR COATING WIRE OR FORMING TUBING. O. Munroe, Bayonne, N. J.—The patentee states that wires for electrical purposes are insulated by means of a coating of rubber or other insulating composition, and that ordinarily this composition is applied by passing the wire through the center of a die and simultaneously forcing through the die the plastic material which coats the wire and hardens thereon. This invention aims to provide a machine of this sort which is adapted also to express the plastic material through the die about a stationary central core, so as to form it into a tubing.

No. 791,193, May 30, 1905. MACHINE FOR STRAIGHTENING TUBES, SHAFTS, BARS, OR THE LIKE.—Otto Heer, Dusseldorf, Germany. The machine comprises an eccentric press, in which a die moving up and down in a vertical direction at a considerable speed, produces with variable force the desired effect on the blank, which may be rotated by hand or otherwise, and moves longitudinally beneath the surface of the die in bearings on two blocks. The machine is intended to work in such a manner that all adjusting movements and changes of position which become necessary during the working operation, together with the manipulation of the object to be straightened, can be carried out from two opposite points by one single workman.

No. 789,927, May 16, 1905. SOLDERING IRON.—M. Mossig, Berlin, Germany. The soldering iron has a movable bit. It is provided with a hollow handle through which the gas enters into a comparatively large combustion chamber. In this chamber the gas and explosive mixture burns. The lighting-back of the flame is prevented by a piece of wire gauze arranged between the mixing tube and the combustion chamber.

TRADE NEWS

Trade News of Interest Desired from All of our Readers. Address THE METAL INDUSTRY, 61 Beekman St. New York.

Sargent & Co., of 149 Leonard street, New York, are issuing an illustrated booklet about house door locks.

John O'Shea has reopened his brass foundry at Binghamton, N. Y., where he has an outfit for making castings in brass, aluminum and bronze.

The Atlas Silver Foundry are established in their new quarters at 86 Union street, Attleboro, Mass., where they make a specialty of fine ornamental castings in gold, silver and bronze.

N. B. Gaston's Sons Company, scale makers of Beloit, Wis., report they never had so many unfilled orders in hand as at present. Their domestic and foreign trade is on the increase.

The business of electro-metallurgy and coloring of jewelry heretofore carried on by John P. Bonnett of North Attleboro, Mass., has been changed to the firm name of John P. Bonnett & Son, as Frank P. Bonnett has associated himself as a partner in the business. The firm announces that the high standard of excellence which has characterized their goods in the past will be continued in the future.

The Warner & Swasey Company, of Cleveland, Ohio, have broken ground for a large addition to their work, including new offices. The new section of their main building will be 55 x 240 feet and five stories high above the basement. It will be of fireproof contruction and most modern in every particular. A complete new power plant is to be provided. These additions will practically double their present capacity.

By a decision of the Treasury Department recently rendered the Government has rescinded the duty on diamonds used in the manufacture of drawing wire. The Waterbury Wire Die Company, of Waterbury, Conn., has contested this duty and has just won the case by which the tariff of 10 per cent is taken off of all drilled stones. The Government will now return to the above company the 10 per cent which they have been paying since the seizure of their imports on August 24, 1903.

The Newburyport Silver Company, which was established at Newburyport, Mass., in 1903, has accepted a very flattering offer from business interests in Keene, N. H., to locate their plant in that city. The capital of the company has recently been raised to $50,000, paid in, and the company will occupy the factory building formerly used by the Trinity Cycle Company. The Newburyport is now enlarging its equipment of machinery and will increase its working force in the near future. The business has more than doubled over the same period last year, and it is the intention of the management to fully maintain the present standard of their goods. A large force of men are now installing machinery in their factory and they expect to renew manufacturing August 1st.

The Colonial Bronze and Silver Company of Kingston, N. Y., which is the successor of the M. E. Moore Bronze & Plate Co., report that they are now in full swing with plenty of orders and a very encouraging outlook for the Fall trade. They are putting on the market a tempering solution which they regard as a great utility for tool makers. Also a soldering fluid which is designed for use on all metals requiring soft soldering. This they say, runs free, does not corrode and leaves no stain of any kind on the metal and is easily cleansed, requiring only a dip in cold water.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

A pamphlet has just been issued by the Eureka Brass Works of Cincinnati, Ohio, on their "Eureka Valves and Unions."

The Manning, Maxwell & Moore Company of New York have absorbed the Shaw Electric Crane Company of Muskegon, Mich.

The J. D. Smith Foundry Supply Company of Cleveland, O., is issuing a pamphlet of its grinding machinery, blacksmith forge and crocodile shears.

Owing to a $10,000 loss by fire of the Wire Novelty Manufacturing Company, New Haven, Conn., a number of people were temporarily thrown out of work.

The Chicago Brass Company, having purchased the Benedict & Burnham Brass & Copper Company of Chicago, Ill., have increased their capital stock from $350,000 to $1,250,000.

The Norton Emery Wheel Company has bought land at Greendale, Mass., that they may build a driveway and a bridge over a nearby stream as an approach to their factory grounds.

The Bates & Peard Annealing Furnace Company of Huyton, Liverpool, England, announce that their furnaces are going very well in all parts of the world, and a nice little business is being done with them.

The Bristol Specialty Company will enlarge their business and equip a new factory at Pequabuck, Conn. They desire the latest catalogue and price list of firms who sell them metals, machinery and supplies.

The Ellwood Ivins Tube Works, Oak Lane station, Philadelphia, Pa., are sending out postal cards with samples of their tubing attached. They manufacture aluminum, copper and brass tubing in special sizes.

The Egyptian Lacquer Manufacturing Company, 152 Front street, New York, makers of superior lacquers for metal goods, report that their "Helios" lacquer is being used extensively on goods finished in royal copper.

The motion to remove the receiver of the Eclipse Brass Manufacturing Company of Cleveland, Ohio, has been denied, and Joseph L. Stern is still receiver, pending a trial by jury, which is to come up in the October term of the Cleveland Court.

A new cleaner for the use of platers has recently been put on the market by the J. B. Ford Company of Wyandotte, Mich., who manufacture a variety of cleansing products. The "Wyandotte Cleaner" is particularly suitable for use in plating iron.

Lehman Brothers, dealers in old metals at 401 Jefferson street, Hoboken, N. J., report that their business in the last six months has increased over 50 per cent. They are exporting scrap aluminum extensively and are cash buyers of old metals in any quantities.

The American Brass Company has changed the pay day of its Ansonia mill from Thursday to Wednesday as a matter of accommodation to the Ansonia merchants, and especially to make the pay days of all the mills of the American Brass Company uniform.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock on August 8, 15 and 29 for a variety of metals, supplies and machinery which is furnished by the non-ferrous metal industry and kindred interests.

An interesting illustrated pamphlet on Foundry Chaplets and Anchors has just been issued by W. W. Lindsay & Co., Harrison building, Philadelphia, Pa. Besides furnishing foundry supplies W. W. Lindsay & Co. are designers and builders of steel buildings, new masonry and concrete work, etc.

The S. Obermayer Company, manufacturers of foundry facings and Supplies, of Cincinnati, Chicago and Pittsburg, announce they have opened an office at 120 Liberty street, New York. Mr. Edgar G. Seaman, who has represented the company at Pittsburg for many past years, has charge of the New York office.

The Driver-Harris Wire Company of Harrison, N. J., is having built a $10,000 brick addition to its present plant on New Jersey Railroad avenue. The new building will be used for offices and a shipping room. The company has bought considerable land adjoining the present buildings for extensions to be made later on.

Theo. A. Sippel of 205 McWorter street, Newark, N. J., the manufacturer of the Sippel sand blast, announces that he will ship to any responsible manufacturer one of his sand blast machines on trial, and if it is not satisfactory the machine can be returned and he will pay the freight. Mr. Sippel can furnish a number of references to any one interested.

A large assortment of second-hand machinery in first-class condition, and another lot in good working order, is offered for sale by the C. C. Wormer Machinery Company, Detroit, Mich. The list includes milling machines, turret lathes, spinning lathes, polishing lathes, screw machines, screw slotters, cock grinders, cinder washers and other machinery used by metal workers. A complete list will be found on another page.

The Standard Brass Casting Company of San Francisco, Cal., have just put inoperation an extensive brass finishing shop in connection with their brass foundry, and announce that they now have one of the most complete plants on the Pacific coast. Their specialties are brass water goods, trolley wheels, gas fittings and general brass finishing. Their superintendent, Mr. J. M. Fyfe, was formerly in charge of C. M. Crane Company's finishing shop for ten years, and also superintendent of the Acorn Brass Works of Chicago.

"Lycodin," a substitute for lycopodium, used for parting purposes in brass and iron foundries, is put on the market by the Hill & Griffith Company, Cincinnati, Ohio, manufacturers and selling agents of foundry facings, supplies and equipments. "Lycodin," the firm states, is light in weight and has all the characteristics of lycopodium and does the same work, and does it as well at half the cost. In a circular issued on "Lycodin" by the Hill & Griffith Company, there is a list of firms who have used "Lycodin" and are pleased with it. The list includes some of the largest brass foundries and brass works in the country. A trial sample of lycodin is sent free of charge by the Hill & Griffith Company.

Among the large British plants which have of recent years put in the ventilating apparatus described on another page of this issue, are the following firms: Messrs. Brampton Brothers, Best & Lloyd, T. Chatwin, Eagle Manufacturing Company, Gunn Castor Co., Cooper & Edman, A. Hughes, Imperial Brass Foundry Company, Ltd., G. H. Johnstone & Co., J. Lucas, Ltd., G. Marris & Son, Ltd., Mansell & Son, Phillips & Co., Royal Small Arms Factory, Tangyes, Ltd., Webley & Scott Revolver Co., etc., all of Birmingham. Also Messrs. Cannon Iron Foundries, Ltd., Deepfields; Rover Cycle Co., Coventry; Baths Foundry Co., Rotherham; Hardy Patent Pick Co., Sheffield; Pickersgill & Frost, Langley, Notts; Ralph & Jordan, Bilston; Tonks & Co., Wolverhampton; G. N. Rly, Doncaster; Waine & Co., Willenhall; Wright & Co., Rotherham, etc.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

NEW CATALOGUES

A catalogue of the Steele-Harvey Crucible Melting & Refining Furnace and miscellaneous furnaces used in connection with fuel or gas and air, has just been issued by the Monarch Engineering & Manufacturing Company, of Baltimore, Md. Besides a complete illustration and description of the furnaces made by the Monarch Company, there are directions for the operation of the Steele-Harvey Melting Furnace, information about fuel oil and its uses, air compressors, low pressure boilers and other matter which is of interest to the founder. There are also published a number of testimonials about the company's furnace, which has made such rapid strides since first placed on the market. The catalogue is one that will interest every foundryman and others who are interested in the use of oil fuels.

"Minting Machinery" is the title of a handsome, illustrated catalogue just issued by the E. W. Bliss Company of Brooklyn, N. Y. The catalogue relates to the standard types of the Bliss mint machines, contains half-tone cuts with ample description of each machine, also of the melting furnace and annealing furnace. The requirements are listed for a complete coining outfit, including the various departments in melting, rolling, cutting or adjusting, engraving, coining, seething or cleaning bullion or weighing, shafting, etc. The E. W. Bliss Company recently purchased from the Orr & Hess Company, Philadelphia, whose machines have been used for many years by the United States government, their patterns, drawings, designs and good will, and now build the same types of machines formerly built by Orr & Hess.

MEETINGS

At the annual meeting held recently of the John Russell Cutlery Company, Turner's Falls, Mass., the following officers were elected: President, Charles E. Stevens of Ware; treasurer, Warren P. Dustin; assistant treasurer, E. P. Hitchcock; clerk, Frederick Clapp.

The quarterly meeting of the Cincinnati Metal Trades Association, was held at the Zoological Garden Clubhouse on Thursday evening, June 29. The Von Wyck Machine Tool Company, Conway & Co. and the American Valve & Meter Company were proposed for membership and unanimously elected. Other minor business matters came before the meeting and the rest of the time was spent socially.

The Brass manufacturers of the United States, in common with other manufacturers of goods in the plumbing line, met with the various jobbers' associations at the Russell House, Detroit, Mich., on June 27, 28 and 29. Arrangements were made and delegates chosen for the purpose of more harmonious and reciprocal relations between the different manufacturers and jobbers' associations. The meeting was largely attended and very successful from every point of view.

The report of William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., for the year ending April 30, 1905, was submitted to the annual meeting of the stockholders, held in Philadelphia June 29. The total gross earnings from shipbuilding, brass foundry and other departments were $7,383,308. The total net earnings were $711,894, and after interest charges, taxes and insurance had been deducted the net earnings amounted to $314,165, a considerable increase over 1904 and 1903. The president, Henry S. Grove, in mentioning the work of the brass foundry, said: "The brass foundry, through its specialties in fine combinations of metals and success in difficult castings, is making great progress and has just closed a year exceeding in profit the previous one, which was then by far the most prosperous in its history. Our business in this department is increasing with wonderful rapidity. We are constantly making additions to develop and foster the trade we are securing."

PERSONAL

William G. Kelleweay has resigned as foreman of Wm. Hall & Co.'s brass foundry, Boston, Mass., to accept a like position with the Hub Foundry & Plating Company of Ossining, N. Y.

C. A. G. Winther, who resigned from the Chapman Valve Manufacturing Company, Indian Orchard, Mass., April 1, has accepted a position with the Roe Stephens Company of Detroit, Mich.

Isidor Lehman, the traveling representative of Lehman Brothers, metal dealers, of Hoboken, N. J., leaves August 8 for an extensive European trip in the interest of the firm's export business.

Fred H. Bowersock has established an office at 35 Nassau street, New York, where he makes a specialty of patent and trade mark causes, particularly patents and trade marks relating to the non-ferrous metals.

Thomas Clare, a manufacturer of all grades of gold, silver and brass solders at Taunton, Mass., reports that for the fourth time he has helped out of trouble one of the largest metal manufacturers in Rhode Island. Mr. Clare is an expert caster and roller and makes a specialty of aiding manufacturers of brass and German silver.

METAL MARKET REVIEW

COPPER.—The price of Standard Copper in London has more or less followed the advance in the home market. Spot copper opened at £65 17s. 6d., and advanced steadily to £68 7s. 6d. at the close. Best selected opened at £70 10s. and closed at £73, showing an advance for the month of £2 10s.

The special features to note in the domestic market is the increased and persistent buying by consumers and the consequent scarcity of supplies. There has been no manipulation, there has been no boom, but there has been a big and more or less unlooked-for midsummer demand from consumers, and this combined with the late heavy exports, has placed the market in a very strong position. Several producers are sold up to the end of September and have not very much to offer for October delivery. There is enough copper to go around, and it is against the policy of the larger producers to have any run away advance in price, but the market is legitimately very strong, and with a good fall trade predicted prices are more likely to move up a quarter or half cent rather than sag off. The demand from abroad continues good, the exports for the month of July, while not as heavy as some recent months, show fairly large, being 17,213 tons to date, against 19,490 tons same month last year. The corrected returns for the month of June give the exports as 22,096 tons. The total exports for the seven months of 1905 show 147,014 tons, against 133,534 tons for the same period last year. Prices for all grades of copper have advanced fully ⅜ of a cent during the month, and at the close carload lots Lake August, September deliveries are quoted at 15⅜, October 15¼ to 15⅜, smaller lots 15½ to 15⅜ for carloads, 15½ small lots. Casting brands 14¾ to 15 cents.

TIN.—Everything known and unknown has contributed and confirmed the bull campaign in pig tin in the London market. Statistically the market was never stronger, the total visible supply June 30 was 11,938 tons, against 13,780 tons same month a year ago, the stocks of tin actually on hand (7,800 tons) represented about two weeks' consumption and the shipments from the Straits were a few tons less than last year. The consumption for America for the month of June was estimated at 3,600 tons (against 3,400 tons for the month of May, and 2,900 tons for April); these heavy "deliveries" were probably put in to "adjust" the stocks in America for the half year, for it hardly seems probable, much less

TRADE NEWS

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possible, that home consumption suddenly increased 15 per cent, but it was used just as willingly as the known facts to help along the bull campaign. The Straits show no signs of increased supplies, while the Banka and Billiton sales will be reduced about 50% during the coming year. The price in London, spot tin, opened at £138 15s., advanced to £150 10s. on the 26th, and with the Banca sale in Holland the 27th, the price broke and the market closed at £148 17s 6d., showing an advance for the month of about £11 a ton. Trading in the London market has been very heavy, our market has been so much below the London parity it has been almost impossible to do much business. Prices in the New York market have followed the advances in London; there has been no special interest taken in the market and although we have had one of the strongest and safest bull markets to work on, there has been absolutely no speculation whatever. At the close 5 and 10 ton lots spot are worth 32.80 f. o. b. New York, September, October deliveries, 32.70 to 32.60; small lots spot 33 cents.

LEAD.—The London price opened at £13 7s. 6d. and advanced to £14, closing at £13 17s. 6d., a net advance of 10s. The demand for all metals has been good and lead has shared in it. The leading producers advanced the price $2 a ton, from 4.50 New York shipment to 4.60, while small lots spot lead are selling at 4.70 to 4.75.

SPELTER.—The London price opened at £23 17s. 6d., advanced to £24 17s. 6d. and closed at £23 17s. 6d. The spelter market is very strong and as all brass manufacturers are interested the market will pay to watch. Some in the trade predict 6c. spelter very soon. Ores are scarcer and higher and the market generally is very strong. Closing carload lots 5⅝c., New York shipment, smaller lots 5¾c.

SILVER.—The silver market has varied very slightly; London opened at 27 1-16 advanced to 5-16 and closed at 27 3-16. In the New York market prices have followed London, closing at 58⅛c.

OLD METALS.—The market has ruled dull and generally unsatisfactory. Copper, good heavy stock is always in demand, and is more or less scarce. Heavy brass has been rather more active, and zinc dross, which has had a substantial advance, closed at 4.50 to 4.60, New York, carload lots.

TRADE WANTS

ANSWERS SENT IN OUR CARE WILL BE FORWARDED.

WANTED—TO RENT (MAY PURCHASE LATER), SMALL BRASS FOUNDRY AND MACHINE SHOP CONVENIENT TO NEW YORK. ADDRESS WITH FULL PARTICULARS G. W. KYBURG, P. O. BOX 237 NEW YORK, N. Y.

ROLLING MILL EQUIPMENT FOR SALE.—One stand, 16x32, and one stand 17x24 chilled rolls, with two sets driving gear, all complete. One 4 ft. by 8 ft. annealing furnace. One No. 4 Cincinnati geared squaring shear, 36 in. knife. One No. 205 Niagara circle and slitting shear. One heavy Farrell foundry slitting shear, slits 3-16 stock, in use only one year and practically new. Also 12x30 Corliss engine and boiler complete; used to drive above, and several other items, pickle and water tubs, etc., for use in rolling sheet silver, brass or kindred metals. Address ROLLING EQUIPMENT, care THE METAL INDUSTRY.

FOR SALE.—Small aluminum factory. First-class equipment. Natural gas engine; costs about one cent an hour running. Hair pins, fur chains and small articles made. Never without orders. Machines practically new. Can teach purchaser to run business successfully in one month. Price, $1,500; $600 cash, balance on time to suit purchaser. A snap for a hustler. Poor health reason for selling. Address Aluminum Factory, care THE METAL INDUSTRY.

WANTED—A SALESMAN to sell crucibles in Chicago and vicinity. Address CRUCIBLE, care THE METAL INDUSTRY.

WANTED PLATER as foreman for a COLD GALVANIZING PLANT, capacity 10 tons per day. Must be thoroughly practical, competent to handle men and able to turn out large quantities of material. State age, experience, references and salary expected. Address A. B., 642 E. 23d st., Brooklyn, N. Y.

POSITION WANTED for SOFT SOLDERING on WHITE METALS or on BRASS. Have had 15 years' experience. Address SOLDERER, care THE METAL INDUSTRY.

FACTORY WANTED to manufacture small brass and steel specialties under a special agreement. A plant desired with sufficient capital to handle large orders. Address BRASS FACTORY, care THE METAL INDUSTRY.

FOR SALE—A 20-inch diameter by 36-inch face, extra heavy rolling mill, all complete for rolling hot or cold metals. Also a complete annealing furnace. Address ROLLING MILL, care THE METAL INDUSTRY.

WANTED—A Superintendent for a small plant making aluminum cooking utensils and specialties. Must be thoroughly practical. State age, experience and salary expected. Address Lock Box 635, Uhrichsville, Ohio.

POSITION desired as Foreman by a first-class Chandelier and Pattern Maker with 25 years' experience. I am well acquainted with modern antique work and finish. Address CHANDELIER FOREMAN, care THE METAL INDUSTRY.

CORE MAKER FOREMAN WANTED—First-class man who is capable of getting out cores at minimum cost. The work is structural and ornamental iron and bronze. State salary wanted, ability, etc. Address CORE MAKER FOREMAN, care THE METAL INDUSTRY.

WANTED—Machine for polishing tubing. Address MACHINERY, care THE METAL INDUSTRY.

PLATER, CHEMIST and ETCHER desires position. Understands all finishes, and is capable of taking care of any shop. Address P. C. E., care THE METAL INDUSTRY.

MANUFACTURER'S AGENT—I desire to represent in Reading, Pa., and vicinity the manufacturers of metals, supplies and machinery for brass and iron foundries and factories. I have a wide acquaintance among the manufacturers of this section. Full particulars and references cheerfully furnished. H. E. HARBSTER, Reading, Pa.

A PARTY WITH $2,000 can learn of a good opportunity to enter the plating business in a shop which has been established six years in a good western city. Experience is more essential than money. Address, OPPORTUNITY, care of THE METAL INDUSTRY.

FOR SALE Several valuable patents for grinding, scouring and plating all kinds of metal. For further particulars address, THE METAL INDUSTRY.

POSITION WANTED BY A SUPERINTENDENT. Has had 25 years' experience in brass cutting-up shops. Is an A1 tool maker and has executive ability. Can introduce new tools and labor saving machinery. Address SUPERINTENDENT, care THE METAL INDUSTRY.

ALUMINUM PLATING. We have mastered the art of plating aluminum with silver, gold, copper, gun metal and any other finish desired. We are prepared to make contracts for plating any metal on aluminum. Address the ALUMINUM PLATING COMPANY, 182 West Houston Street, New York City.

WANTED—A SALESMAN, who visits plating concerns, to sell a chemical as a side line. Address, with full particulars, HUSTLER, care THE METAL INDUSTRY.

WANTED—A FOREMAN in BRASS FOUNDRY. One familiar with mixtures and machine molding and competent to handle men properly; non-union. None others need apply. Address, with references, FOUNDRY FOREMAN, care THE METAL INDUSTRY.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

Metal Prices, August 3, 1905

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malacca	32.75
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	15.50
Electrolytic	15.25
Casting	15.12½
SPELTER—Duty 1½c. per lb.	
Western	5.65
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.70
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Hallets	15.00
Cooksons	17.37
Other	14.00
NICKEL—Duty 6c. per lb.	
Large lots	45 to 50
Small lots	50 to 75
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.60¾
PLATINUM—Duty Free	20.75
GOLD—Duty Free	20.67
QUICKSILVER—Duty 7c. per lb. Price per Flask.	41.00

Zinc—Duty, Sheet, 2c. per lb. 600-lb. casks, 7.25 per lb., open, 7.25 per lb.

Tobin Bronze—Rods, Unfinished, 19c.

Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16 to 17c.
Phosphor Bronze, Ingots	16 to 20c.
Silicon-Copper, Ingots	32 to 36c.

OLD METALS

Heavy Cut Copper	13.25c.	13.75c.
Copper Wire	13.00c.	13.25c.
Light Copper	11.75c.	12.00c.
Heavy Mach. Comp	11.25c.	11.50c.
Heavy Brass	8.25c.	8.75c.
Light Brass	7.12½c.	7.50c.
No. 1 Yellow Brass Turnings	7.75c.	8.00c.
No. 1 Comp. Turnings	9.50c.	10.00c.
Heavy Lead	4.00c.	4.25c.
Zinc Scrap	4.12½c.	4.25c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	12.00c.	18.00c.
Old Nickel	15.00c.	25.00c.
No. 1 Pewter	20.00c.	21.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	19	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	20
	Longer than 96 ins.	19	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	19	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	19	20	22
	Longer than 120 ins	19	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	19	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	21	23	27
	Longer than 120 ins.	19	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	19	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	19	19	20	22	25	
	Longer than 120 ins	20	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	19	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	19	19	21	24	29	
	Longer than 120 ins.	20	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	20	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	21	21	23	26		
	Longer than 120 ins.	22	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	23	23	25			
	Longer than 132 ins.	24	24	27			

Rolled Round Copper, ⅜ inch diameter or over, 19 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, August 3, 1905

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb..... 23c.
Lighter than 10 oz..... 29c.
10 oz. and up to 12 oz..... 26c.
12 oz. and up to 14 oz. to square foot, per lb..... 24c.
Circles less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order. Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.23	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.28
Above No. 10 to No. 16	.23½	.27½	.28½
Nos. 17 and 18	.24	.28	.32
" 19 and 20	.25	.29	.33
No. 21	.26	.30	.34
" 22	.27	.31	.35
" 23	.28	.32	.36
" 24	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 30 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3½ in. O. D. Nos. 4 to 13 Stubs Gauge, 20c. per lb. Seamless Copper Tubing, 23c. per lb.
For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

									Per lb
Plain	Round	Tube,	¾	in.	up	to	2	in., to No. 19,	inc.	$0 35
"	"	"	⅞	"	"		1¼	" " 19,	"	36
"	"	"	1⅛	"	"		1⅝	" " 19,	"	38
"	"	"	1⅜	"	"		1⅞	" " 19,	"	41
"	"	"	1⅝	"	"		2⅛	" " 19,	"	48
"	"	"	1	"	"		2	" " 19,	"	65
"	"	"	1⅛	"	"		2½	" " 19,	"	1 00
"	"	"	1⅜	"	"		3	" " 19,	"	1 50
Smaller than ¾ inch										Special
¾ inch to 3 inch, to No. 19, inclusive										38
3 inch										40
Over 3 inch to 3½ inch										45
Over 3½ inch										56

Bronze and copper advance 3 cents. Discount 35 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	*3 in. 12 in. in coils.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in	Cutting to Length.	Polishing or Satin Finishing One side.
No. 13	42	42	44	44	44	44	47	47	47	1	2
" 14	42	42	44	44	44	44	47	47	47	1	2
" 15	42	42	44	44	44	44	47	47	47	1	2
" 16	42	42	44	44	44	44	47	47	47	1	2
" 17	42	42	44	44	44	44	47	47	47	1	3
" 18	42	42	44	44	44	44	47	47	50	1	3
" 19	42	42	44	44	44	44	47	48	51	1	4
" 20	42	44	44	44	44	46	49	50	52	1	4
" 21	42	46	46	46	46	48	51	52	58	2	5
" 22	42	46	46	46	48	48	51	55	59	2	5
" 23	42	46	46	46	48	48	51	57	60	2	6
" 24	42	46	48	50	50	50	53	59	62	2	6
" 25	44	47	49	51	51	51	54	61	65	2	7
" 26	44	47	50	54	54	54	59	63	69	2	8
" 27	44	48	52	56	56	57	62	66	72	2	10
" 28	44	48	54	56	57	57	64	70	75	2	11
" 29	46	49	56	58	60	60	69	75	80	2	13
" 30	46	50	58	60	64	70	77	80	85	2	15
" 31	48	52	60	63	68	76	79	82	88	3	17
" 32	50	54	62	66	74	82	89	95	100	3	19
" 33	52	56	65	70	78	89	96	05	115	3	21
" 34	55	60	67	75	83	96	108	115	125	3	25
" 35	.....	70	75	85	95	105	120	130	.....	.....	Polished or Scratch Brushed 2 sides double above prices.
" 36	.....	85	95	105	120	125	140	.....	.....	.....	
" 37	.....	100	110	125	140	155	170	.....	.....	.....	
" 38	.....	120	135	150	165	180	200	.....	.....	.....	
" 39	.....	140	160	180	200	220	.....	.....	.....	.....	
" 40	.....	170	200	220	240	.....	.....	.....	.....	.....	

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheeet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

Discounts as Follows are Given for Sheet Orders Over 200 Pounds.

200 to 1,000 pounds.....10 per cent. off list.
1,000 to 2,000 " 10 per cent. and 2 " "
2,000 to 4,000 " 10 " " 3 " "
4,000 pounds and over 10 " " 5 " "

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

STUBS' G.	1-4"	3-8"	1-2"	5-8"	3-4"	1"	1 1-2"	2"	2 1-2"	2 3-4"
4 to 11	.....	.....	96	86	83	77	67	61	61	61
12	.....	1 08	96	86	83	77	67	61	61	61
13	.....	1 08	96	86	83	77	67	64	64	64
14	.....	1 08	96	86	83	77	67	64	64	64
15	.....	1 12	96	89	86	80	70	67	67	67
16	.....	1 15	99	93	89	83	70	70	70	70
17	.....	1 18	1 02	96	93	86	73	73	73	73
18	1 85	1 24	1 05	99	93	86	77	77	77	80
19	1 88	1 28	1 08	1 02	99	93	83	86	80	83
20	1 95	1 31	1 15	1 08	1 05	99	89	86	86	89
21	2 01	1 37	1 21	1 15	1 12	1 05	99	93	93	96
22	2 17	1 44	1 24	1 18	1 15	1 08	1 05	99	1 05	1 05
23	2 33	1 50	1 31	1 24	1 21	1 15	1 15	1 08	1 15	1 15
24	2 48	1 60	1 37	1 31	1 28	1 18	1 21	1 21	1 24	.....
25	2 65	1 69	1 47	1 37	1 34	1 28	1 34	.....	.....	.....

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

Discounts as Follows are Given for Tube Orders Over 50 Pounds.

50 to 200 lbs..... 5 per cent. discount off list
200 to 2,000 lbs.....10 " " " " "
2,000 to 4,000 lbs.....10 and 3 " " " " "
4,000 lbs. and over.....10 and 5 " " " " "

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B.& S.G'ge.	0000 to No.10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 53

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Srape's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.